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FOOD INDUSTRIES

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

WHERE IS THE FOOD PLAN? ... 1943 WILL BE MUCH TOO LATE

(SEE PAGE 31)

APRIL 1942

Acid Detergent Washes Cans Clean

Faulty Retorting Practices Revealed

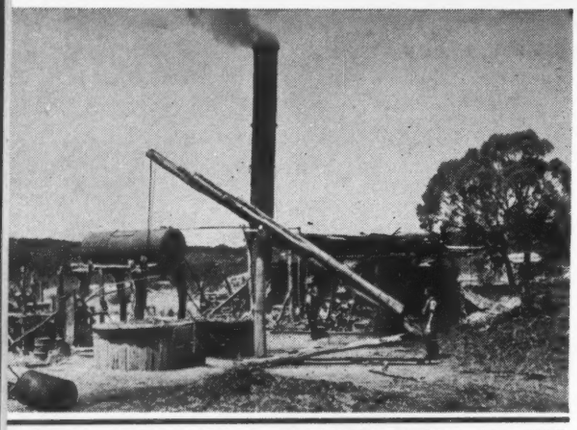
System Is Key to Controlled Quality

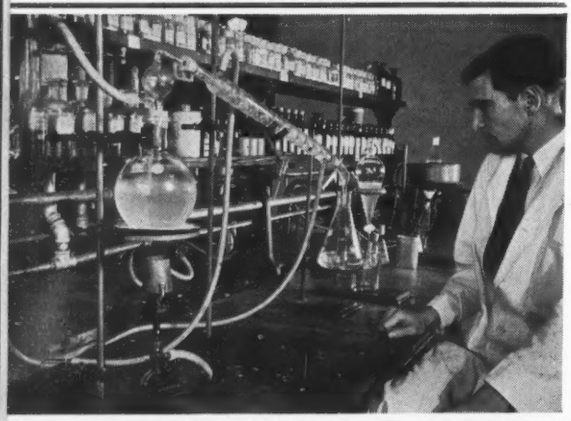
What's Known About Dehydration

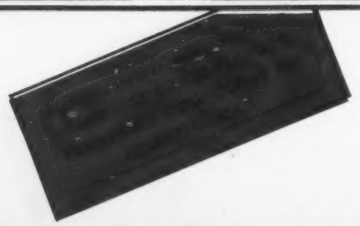
PACKAGING . . . WARTIME PROBLEMS AND SOME SOLUTIONS

A McGRAW-HILL PUBLICATION

BACKGROUND VALUES . . . a PART of the product APART from the price







HIGH up in the list of cardinal business virtues is that of *thoroughness* . . . of doing the job *well* if the job's worth doing at all. Certainly the prod of thoroughness has been a moving force in many of the undertakings our organization has initiated. Conspicuous among these is the vast fund of authentic data on the technical, scientific and commercial aspects of essential oil production which has been gathered by us since these studies were inaugurated seventeen years ago and which is based upon first-hand investigations of original sources of supply. In that time, our research specialists have traveled tens of thousands of miles and covered personally all but a very few of the world's principal centers of production. Typical, also of FRITZSCHE thoroughness was the establishment, some years ago, of factories in France and in America, as the only certain means of providing domestic consumers with plant extractions and essential oils of unqualified purity and uniformity. It goes without saying that this great reservoir of technical knowledge and practical experience, coupled with our findings in research, has provided an invaluable background for the work of our various laboratories in meeting the manifold needs of our customers. It assumes even greater importance, in the light of present day exigencies, as the necessity for developing new and independent American sources becomes more and more urgent. Significant of its import—and already a practical reality, is our collaboration with Government representatives in the furtherance of our industry's vital and increasing needs.

It is a far cry from the distillation of eucalyptus oil in Australia to Paraguay's production of petitgrain, but both fields of investigation have been the subject of studies by our personal representatives. The long range effect of this work is to benefit our research, flavor and perfume divisions . . . and ultimately, our customers. Photos from top to bottom: Australian eucalyptus still; native still for petitgrain, Paraguay; steam distillation in our General Research Laboratory; part of the Flavor Research Laboratory in our New York plant.

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FACTORIES AT CLIFTON, N. J. AND SEILLANS (VAR) FRANCE

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THE COVER

The time is now, not 1943 or later, systematically to plan our food processing and packaging program. Commendable steps have been taken by the government to increase the production of foods on United States farms, and the increase this year will be tremendous. But that is not enough. Most of this food must be processed and packaged before it can be used to feed civilians, the armed forces or our allies. Furthermore, if the equipment and materials for processing and packaging are not made available, some of the increased food production will go to waste. And that will bring a storm of public protest down about the heads of both the food processors and the government. This problem is discussed in an editorial on page 31.

FOOD INDUSTRIES

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This Issue

Packages for Patriots

As President Roosevelt himself stated in his radio talk on March 9, food is vitally important to the winning of the war. And food will be produced by the United States in quantities never before even dreamed of. But to be effective in the war effort, most of this food must first be processed and then packaged.

This last requirement is going to be a tough one to meet, what with shortages of tin, rubber, cork and other vital packaging materials. But something can be done about it, and alert food manufacturers are making definite progress in solving packaging difficulties. Page 35.

No More Smelly Cans

Upon standing for only a few hours, cans, bottles and other containers, supposedly washed clean, often develop unpleasant odors.* Research has shown that these containers actually have a film that supports bacteria.

As early as 1940, Dr. F. M. Scales and M. E. Parker showed that an acid rinse avoided much of this trouble. Since then, Dr. Scales, who is director of the research laboratory of Sheffield Farms Co., has experimented with an acid detergent. He finds that it not only solves the problem but cuts costs. Page 51.

Not Magic But Method

It's not magical formulas, mysterious ingredients or trick processes that make good foods good. It's just plain and prosaic use of system in checking and controlling the many variables entering into the manufacture of the food. The effective quality control program is divided into four parts: (1) Quality of raw materials, (2) uniformity in production processes, (3) quality of finished products, and (4) laboratory research. How this system should be applied to cake baking is told in page 54 by W. R. Van Meter, Kingston Cake Co. The principles apply in all food industries.

Some Faults Were Found

Packers of the relatively new and popular pork luncheon meat have, for reasons of quality, seen fit to use a less severe retorting procedure than is used for some other canned products. Which led to a study of their retorting practices. Out of this has come some new knowledge on the efficiency of various retorting procedures, showing up some of them as unsatisfactory. Here is information of real practical value to all who use retorts. It is presented on page 62 by O. F. Ecklund, H. L. Roberts and H. A. Benjamin of American Can Co.

Coming

Latest on Frozen Foods

For the past few weeks Food Industries has been making a comprehensive survey of the frozen food industry, and the findings of this study will be presented in detail in the May issue. This new edition of the Frozen Foods Directory will not only show the trends of the industry but will list the commercial freezers and give their brand names, the products frozen, types and sizes of containers, freezing methods, and output. You will not find this information anywhere else.

Blow-ups Without Bombs

Just as dangerous as a bomb dropped from an enemy plane is an oven or boiler filled with an explosive mixture of fuel and air. Flame failure sometimes produces such a condition, and re-ignition of the flame sets off a blast that wrecks equipment and kills men. Fortunately there is available control equipment which will prevent such disasters. This equipment and various ways of applying it will be described in an early issue.

Cooling Improves Color

Better canned foods are the goal of continued research and experiment by the food industries, and from time to time Food Industries has the opportunity to report progress. One new development, as described by one of our contributors in the Northwest, has to do with salmon canning. By mechanizing the cooling of the canned product so that its temperature is rapidly reduced after the cans leave the retort, the lively red color of the product is better retained. How this was done will be told in a forthcoming issue of Food Industries.

Meeting Federal Requirements

Improved methods of analysis, introduced in recent years, have led the Food and Drug Administration to much stricter enforcement of the definition of tomato products and to the seizure of products containing overripe, moldy or otherwise spoiled tomatoes. Therefore, it has become increasingly important for producers of these foods to keep a strict watch on their operations, particularly by means of careful laboratory analysis of their output prior to shipping.

To test the methods available for such analyses, three separate analyses of each of nine commercial brands of tomato catchup were made by the Department of Bacteriology of Ohio State University. D. Frank Holtman of that University will give the results in an early issue of Food Industries.

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FOOD INDUSTRIES
FOR THOSE WHO CONTROL QUALITY
THROUGH MANAGEMENT AND PRODUCTION

LAURENCE V. BURTON, Editor APRIL, 1942

Where is The Plan?

LET us understand one point clearly. Food in the United States will not lick the Japs nor Hitler. Munitions of war—guns, planes, shells, tanks and ships—and nothing else that we can produce, will destroy the enemy. MUNITIONS COME FIRST. FOOD COMES SECOND, despite the slogan of the Secretary of Agriculture. Munitions of war properly used by the Armed forces of the United Nations will win the war. Nothing else can do it. But unless the United Nations are properly fed, the munitions and the will to keep on fighting will be lacking.

Our great American complacency, our mawkish sentiment that America is the land of plenty, our absurd notion that we can arm and provision half the world without planning for provisioning, as well as for arms production, is not only disgusting—it is alarming. Possibly because food is as basic and vital as life itself, our government cannot comprehend the scope of planning needed.

Situation Serious

In this editorial I shall cite a few surface manifestations of muddling. And muddling is nothing but proceeding in all directions at once in the absence of a definite route to follow. We cannot hope to win a war against such crafty planners as the Nazis and the Japs by muddling, even on the food question. Keep in mind that the food industry is geared to feed a normal population of 130,000,000 persons plus a small export. Today the food industry is expected to feed our 130,000,000 persons plus a huge export demand which I calculate to total the equivalent of about 200,000,000 persons.

On top of that we have been crushingly defeated, so far, everywhere that really counts. We can't get rubber, we can't get tin, tung oil or perilla oil, all of them important items to food preservation. These shortages are in addition to the shortages of domestic origin—steel, paper, cellophane, refrigeration and dehydration equipment and similar things needed for food preservation.

That the U. S. Department of Agriculture has taken steps to stimulate increased food production is well known. Secretary Wickard has announced a huge increase in production goals for vegetables, for pork, for milk, for eggs; and, by the vast financial powers of AAA, he has all this on the way.

Comes the Muddling

Now we come to February 23, when the House Agriculture Committee was questioning Brig. Gen. Lewis B. Hershey of the Selective Service Administration on drafting farm workers. He stated that about 1,000,000 farm workers had been lost from agriculture, through the draft, voluntary enlistment and migration to industrial work. He wants authority from Congress to allocate men to farm and industrial work as well as to the Army. Yet when food technologists are called up before local boards they are drafted into the Army.

Nobody in Washington yet realizes that every technical brain we have available will be needed to assist the change-over from customary methods of food preservation to less familiar freezing and unfamiliar dehydration, especially the latter. Nobody yet realizes that to produce all this vast amount of food raw materials will result in sheer waste and spoilage unless the raw materials are preserved. If WPB should cut down on the steel allocated to metal food containers, as seems possible, then the fat will be in the fire unless there is a comprehensive plan for food conservation. If we in the United States were concerned only with feeding ourselves, it would not be so difficult. But we are preparing to feed our allies—a 35 percent increase in the biggest peacetime industry in this country.

Official Confusion

Now let us consider some specific manifestations of muddling. One man from WPB informed a coffee company that it must abandon metal cans and go to paper bags. About the same time another WPB executive informed a manufacturer of paper-bag filling and sealing equipment that he must stop this and go into munitions production. And still another WPB source indicates that paper bags may soon be too scarce for packaging coffee. Maybe we don't need coffee at all. But where is there evidence of a plan in the foregoing incidents?

Here is another. One man in the food branch of

WPB stoutly maintained that the WPB was opposed to any expansion of food freezing. This, despite the fact that the M-81 Tin Conservation Order was in the making. More recently, the Refrigerated Storage Branch of the Office of Defense Transportation has informally indicated its approval of an expansion of food preservation by freezing. Where is the plan?

The U. S. Department of Agriculture is pushing with all possible speed to develop complete information on how to dehydrate vegetables successfully. But informal word leaks out of WPB that high priorities will be granted only to those who are expert in this field. Where is the plan?

And when we come to the farm bloc seeking 110 percent of parity in Congress vs. OPA and its price controls, one can wax poetic, profane or apoplectic, according to his mood. But, where is the plan?

When Do We Start?

Need one cite more current examples to show how every forward move is offset by some unexpected counter-move when food is concerned? Presumably each and every one of these contradictory actions or statements represents a lot of thought on the part of some one working quite independently.

Do we as a nation have to suffer further disasters before we can have some semblance of a coordinated forward move to provision ourselves and our allies?

If we wait until 1943 to sing the same tune on food preservation it will be too bad for our allies—and some of us.

L V Burton EDITOR

The Talk of the Industry

● AN EXPLANATION is due to readers of FOOD INDUSTRIES for the delays in answering letters. Our editorial correspondence is growing at an astonish-

ing rate and, unfortunately, we find it inexpedient to hire additional personnel to keep up with the mail. It used to be said that we put out two magazines, one of which is typewritten. It can now be said that there are four—the printed page, the typewritten letter, the spoken word to callers and the spoken word via the telephone.

On March 12, our worst day on record, the telephone was in use on incoming calls from as far west as the Mississippi River for a total of five hours. Nearly every phone call and visitor was after more information about dehydration. The only "break" that day occurred when a phone call came about one system just as it was being discussed with a personal caller. One explanation thus served a dual function.

Incidentally we have formed a very low opinion of food company executives who ask lay executives of a large broadcasting company to obtain all the available information about a highly technical subject like dehydration. One might as well ask a theatrical producer. Broadcasters are all right in their own sphere. But we'll be hanged if we will spend time explaining enzymes, latent heat of evaporation, etc., to miscellaneous laymen who don't savvy the subject.

● "THERE are no production problems any more"—the smug edict of the top executive who thinks he is hot stuff as a salesman—ought to be in big letters on a sign where he can see it every day. This comment, often made to us by those who should know better, is about as sensible as to say today that: "There are no selling problems any more."

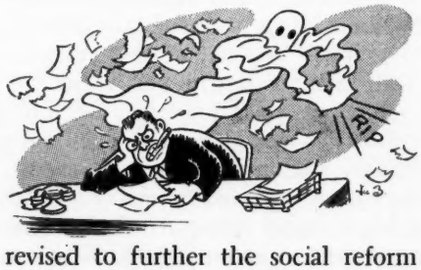
Production and selling problems are always with us and always will be.

● OPA and WPB both assure the nation that recall of Brazilian ships to home ports and cessation of further sailings will have no material effect on the arrivals of coffee and cocoa from Brazil. Which, of course, means that the U-boats are not sinking coffee cargoes in U. S. bottoms.

● THE wooden barrel is returning to use again. A large oil company has recently ordered wooden containers for oil in order to conserve the customary steel drums. Young men will hardly recall wooden oil barrels. The last one we remember was in 1907.

● Now is an excellent time for that great Australian patriot, Harry Bridges, to go home and help defend his homeland against the Japanese invader. He ought to be particularly proud of his contribution to the defense of Australia by the strikes he has pulled in the United States, and perhaps the Australians would reward him appropriately.

● IN SPITE of the patriotic efforts of a large number of earnest people in WPB and OPA, there is something sinister going on that nobody seems willing or able to reveal. As one man formerly of OPA described it, "You work like the devil to create a fair and workable plan. Everybody outside of government agrees that it is good. And then a ghost walks through the place, unseen, but his work is apparent. The plan is mysteriously



revised to further the social reform idea regardless of any merit in winning the war."

● SORRY that we couldn't get around to the Tin Conservation Order before now. The best we could do was to publish it in full in the March number. In this issue we devote considerable space to the outlook for metal containers for the benefit of those who must find substitutes for

tin cans. While we believe that it is complete and correct up to the moment of writing, the picture changes so rapidly that all the checking and double checking possible would not produce a statement that would stand more than a few days.

For one thing, research is going on apace. More significant, however, is the fact that WPB is flirting with the idea that a lot of steel can be conserved by depriving the food industry of metal containers.

Basic philosophy behind the M-81 Tin Conservation Order is a limitation on the total area of tinplate for food containers. Fewer big containers will hold more food than a lot of small containers made from the permitted area of plate.

Packaging Conference —April 14-17

Unless the signs are all wrong, the Packaging Conference and Exposition, April 14–17, Hotel Astor, N. Y., under the auspices of American Management Association, will be one of the most important events this spring. Few, indeed, are those who have no wartime packaging problems.

All programs have been converted to a study of current problems. Interest centers on how to package adequately under today's shortages, and is only remotely concerned with the merchandizing aspects of package design.

The exposition is free to those who have business cards. A moderate registration fee is charged for admission to the conferences. Every food manufacturer is advised to attend.

Dehydrated Food Packages

The moot question of the proper type of package for dehydrated vegetables will be discussed at the Packaging Conference, Hotel Astor, N. Y., April 15. In view of the active interest in this subject, it seems probable that standing room only will prevail.

Tapioca Starch Problem

Something comparable to the fast one that the soap manufacturers have put over is the tapioca situation. The soap folks have succeeded in persuading WPB to allocate all the coconut oil in the country to soap making—a needless and wholly unfair proposal, which should have been blocked in the interest of a reasonable distribution of the oil.

In the case of tapioca or cassava starch, the proposal was to allocate all of it in the United States to non-food uses, such as adhesives for stamps, drinking straws, paper cups, cartons, boxes, envelopes, cigarettes, corrugated and fiber board, veneers, foundry cores; sizing of buckram and rayon; and in water printing-ink pastes. Reasons ascribed to this proposal are largely based on the absence of odor and flavor in tapioca starch or dextrine made from it.

Here again it would appear that equity should prevail and that food stocks of tapioca should not be wholly allocated to non-food uses.

Furthermore, it ought to help "sell" the war to the complacent ones to use an unpleasant tasting adhesive on postage stamps. Let the back side of the stamp be underprinted with such words as:

"Unpleasant Stickum? Japanese to blame. So sorry."

Or, "Stamp tastes bad? Blame the Japs."

The Nutrition Foundation

On March 12, the Nutrition Foundation, Inc., was formally launched as a going concern after many months of preparation. It consists of an organization of 15 of the most forward looking companies in or related to the food processing industry.

Under the chairmanship of Dr. Karl T. Compton, president of Massachusetts Institute of Technology, with George A. Sloan as president, Dr. G. C. King of the University of Pittsburgh as scientific director in charge of research, and Ole Salthe as executive secretary, it has a minimum fund of $800,000 guaranteed

Hors d'Oeuvres

• *Britain has asked its brewing industry to "reach a peak never before dreamed of in the history of brewing."—When the elbow bends, the thumb is up.*

• For each automobile we are not making this year we have saved enough tin for 1,000 cans. But it's impossible for us to not make enough autos to get all the tin we need.

• *Back in 1899 Jewel Tea Co. was a horse-and-buggy affair started on $700. Now it's a flourishing million-dollar business—but withal it may again be a horse-and-buggy affair.*

• The sugar rationing program necessitated the biggest government printing job ever undertaken. Some 700,000,000 forms, cards and booklets have been prepared, consuming 11 or 12 million pounds of paper. The paper situation being what it is, this is sort of borrowing from Peter to pay Paul.

• *Jap farmers on the West Coast are a dominant factor in the production of strawberries. But as much as we like strawberries, we can do very nicely on peaches and cream, thank you Mr. Moto!*

• Latest in restaurant slogans: "Save your sugar. Bring her here for dinner."

• *Beer sales in January were up 24 percent over last year. Apparently the country is keeping up its spirits, in a mild sort of way.*

• Five young doctors at a world-famous clinic did very nicely on a certain intake of Vitamin B_1. Then the dose was doubled and the five were found capable of nearly twice the physical exertion previously observed. So if you need to be twins to handle your wartime duties, just resort to a little biological algebra and multiply U by B_1.

• *Fresh fish are "mined" in the Sahara desert by digging into underground streams. And the catch could be cooked immediately by tossing it onto the hot sand. Veritably, a piscatorial paradise.*

• A new definition of the verb "to glass" will go into the 1942 editions of the dictionaries, reflecting a wartime trend in packaging and, incidentally, testifying to the effectiveness of the glass industry's promotion men.

• *Sugar rationing has its good points. For one thing it will help the ladies to streamline their figures from the inside at a time when external puller-inners are made scarce by the rubber shortage.*

• Employees who voluntarily change their clothes at the factory must do so on their own time, the government says. Wrong John probably will construe this ruling as an unfair discrimination against blue-collar workers.

• *Old tin cans are being shredded and used on a major scale in the Southwest to precipitate copper from mine waters containing copper sulphate. Very good indeed, but not for the food industries.*

• Love jingle a la 1942: "Roses are red; violets are blue, Sugar is scarce and so are you." F.K.L.

with which to encourage research in the field of human nutrition in the next five years.

It augurs well for the future that these founder members have created a foundation to finance needed research and a directive organization to coordinate and steer it into the most fruitful channels. (Further details will be found in the news pages.)

When Charles Wesley Dunn, attorney for Associated Grocery Manufacturers of America, first proposed a foundation several years ago it appeared to be an idealistic dream. Yet here it is, ready to work, and advised by an all-star cast of nutritional scientists. Its plan of operation, to stimulate and direct research or give grants in aid, is eminently practical.

Fortunately the founder members are all firms of long experience in the handling of industrial research. They well know the need for patience and encouragement. And they are seeking fundamental knowledge of nutrition—not applied research for their own corporate purposes. With this high purpose, with its plan of financing, and its splendid scientific direction, the work of the Nutrition Foundation should yield results of inestimable value to the people of the United States.

When You are Offered Higher Wages

Letters from younger food technologists indicate that war industries are luring them away from food industries by much higher wages. War industries probably need them badly or the higher wages would not be offered. But the food industries also need their services—and so does the Army, as soldiers, though not as food technologists.

The best advice we can give to those who are perplexed about their proper procedure is that every man must do his duty to his country. If one feels that his sense of duty calls for a different job, then let him take it. But do not give up a food-company job for mere salary increases, *provided* that the current salary is reasonable and that the job gives a sense of contribution to the war effort. Both provisos are essential.

Look ahead a few years. One can knock off a good whack extra now, and lose it all in a few jobless weeks after war production stops. The food industry, however, will keep on going long after plants making smokeless powder, machine guns, tanks and the like shut down for good.

Food processing is unlikely ever to be able to earn the big profits of, say, the chemical or munitions industries, nor to pay comparable salaries. But for those who like to work with foods it affords an immense satisfaction. Therefore, we counsel that one does not abandon a promising career in foods for money alone.

Vegetable Dehydration No Job for Amateurs

To those who are considering dehydration as a method of preserving vegetables during the emergency, these words of caution are directed. It would be a great mistake to reason by analogy from the drying or dehydration of fruits, an art that is as old as history, to the dehydration of vegetables. A much different set of conditions must be faced in the successful dehydration of vegetables, and it is no job for an amateur. Vegetables can be dehydrated successfully provided the enterprise is backed by the proper technical brains (food technologists) and adequate research, plus proper manufacturing equipment.

It is well to recall the words of Jake Parker of Ogden, Utah, who was asked in 1922 what had become of the Everfresh Food Co. of which he was once president. It had been apparently a flourishing business during the war. He replied, "It burned down, thank God!"

Vegetable dehydration is subject to all the technical perils that have afflicted the vegetable freezing business, and maybe some more. No sounder advice can be given to any food technologist who is working on dehydration problems in this field than to study the problems and experiences of the vegetable freezing industry. But never for one minute should you forget that quality disappears on storage in most dehydrated vegetables. They have a merchantable life that appears to have definite limitations for reasons not wholly clear today.

Enzyme Control

Foremost of all problems is the matter of enzyme control. Dehydrated vegetables are not dried down to 0 percent, but must be dried to figures below 10 percent moisture. It is probable that the enzymes in the dried vegetables can bring about changes in commercially dehydrated vegetables just as they do in frozen vegetables unless the enzymes are inactivated by heat treatment prior to the final processing. It would be unwise to assume that a product that is dehydrated today, and tastes good after cooking tests within a week, will remain good indefinitely. There is definite evidence to indicated that certain dehydrated vegetables under certain conditions may change flavor, and the change is for the worse. Unless you have definite proof that a dehydrated vegetable product will stand up on storage, you should be very cautious. Again we say, follow the examples of quality control utilized by the vegetable freezers.

Promptness Needed

Second in importance are the proper care and preparation of the raw materials and the promptness of processing. The need for promptness cannot be overemphasized. Freezers have been all through these technical headaches and there is no occasion to repeat their costly experiences. Food Industries has observed a tendency on the part of several inquirers to assume, because a vegetable is ultimately destined to be dried out completely, that it can be allow to lie around and wilt prior to processing. In fact, one of the smaller commercial dehydrators has been accustomed to purchase raw materials on the open market, irrespective of their previous history or the length of time after the harvest. Anyone who would do this is wholly ignorant of the principles of food technology. According to E. M. Chace of the Department of Agriculture, it is desirable to use the utmost speed, or else cool at once to 40 deg. F. Yet even at 40 deg. F. quality is lost.

Successful dehydration must combine the best knowledge of canning and freezing with sound engineering and food technology. Just as the freezing operation in quick freezing is but one step in the chain of operations, all of which must be correctly performed, so also is the dehydration operation but a single step in a chain of comparable events all of which must be correctly handled. And even then we cannot ignore the quality deterioration that often occurs in storage.

To go into dehydration of vegetables without a sound understanding of the many problems to be solved is to invite wholly needless trouble.

Food Must Be Packaged . . . Even in Wartime

FOOD production in 1942 will be by far the largest in the history of the United States. Not only must food be supplied in ample quantity to the Army, Navy and civilian population of the United States, but also large shipments of food must be sent to our Allies.

These requirements will be met, in spite of the fact that most of this food must be processed in order to preserve it. Processing facilities will be strained to the limit to do this, and the labor supply will be short. But the job will be done.

Unfortunately, these processed foods must also be packaged. And here two bottlenecks are encountered—one of our own making and the other unavoidable. The bottleneck that was thrust upon us arises from the shortage of various materials normally used in packaging food. Japanese aggression in Malaya and the East Indies has cut off almost all our supplies of tin, the most important packaging material used by food processors. Rubber, of increasing importance to food packers, is cut off for the same reason. Burlap supplies are also short, because of

Package types shown here are likely to endure for war period

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shipping difficulties. Also, various packaging materials made from products of "home growth," such as paper, cellophane and cotton fabrics, are restricted in supply because of war needs.

Substitutions

Substitutions to replace these scarce or unattainable materials are being widely made. And a program of simplification and material saving, participated in by both industry and government, is under way. Progress to date in these matters of substitution, simplification and material saving are discussed in the articles that follow in this packaging section of FOOD INDUSTRIES, together with such government restrictions, limitations and regulations as have so far been issued relating to packaging and packing materials. In later issues of FOOD INDUSTRIES, additional material on these subjects will be published as it becomes available.

As to the second bottleneck, that which is of our own making, it first arose when food processors refused to see the handwriting on the wall. It was clearly evident many months ago that sources of tin, rubber and other materials were endangered. That was the time when foresighted food manufacturers planned substitutions and ordered the machinery necessary to package their products with substitute materials.

Today, these food packagers are having few troubles. But, unfortunately, many food processors waited too long. After Pearl Harbor, when these men tried to get machines that would enable them to substitute new packaging materials for those formerly used, it was too late. Already, most of the packaging machinery manufacturing plant capacity had been converted to war work. And in February, all plants in that industry, under government instructions, began to move rapidly toward 100 percent conversion.

One may question the wisdom of WPB in forcing this 100 percent conversion. It overlooks entirely the war necessity of adequate protection for processed foods. But the orders are out and the conversion is already moving to completion. From now one, new packaging equipment will be very scarce, if not non-existent. And even the highest of priorities will afford little relief, for with the plants converted to war work, most of them could not turn out packaging machinery in any reasonable time even if they were ordered to do so by Washington.

So, in planning substitutions of new packaging materials for those that are no longer obtainable, the food manufacturer must lay his plans so as to avoid the need for new packaging equipment. Rebuilt equipment or used equipment may serve his purpose. Otherwise, he is best advised to adopt the simplest package possible, requiring little but the hand labor of women workers. If this is done, delays, expense and consequent loss of production are most likely to be avoided.

How Some Companies Are Meeting Their Packaging Problems

Summary of the situation with respect to packaging materials and containers. And how some companies are substituting other materials or containers for those that are scarce or no longer available

GOVERNMENT orders forbidding or restricting the use of various strategic or scarce materials have hit a whole host of food packagers squarely between the eyes. Unable to get materials that they have used in the past; they are being forced to use other means for the protective packaging of their products. And this has had to be accomplished practically overnight by most, because few had the foresight to prepare for these happenings before Pearl Harbor forced the War Production Board to clamp down on the use of such materials as tin, foils, rubber and cork and to restrict the use of other materials, including glass, cellophane and various forms of paper.

Hopeless as the resulting situation seemed to many when it was first dumped in their laps, something can be done about it. And the alert food processor is not going out of business, just because he cannot now package his products as he formerly did.

Quite the contrary. Many have already changed their practices, and are using materials that quite likely will serve them through the war period. And this has been done in spite of the continual state of flux and uncertainty that surrounds the packaging material situation. Others have worked out tentative solutions of their problems, but have not yet the experience to show whether or not these solutions are final.

What food processors, packaging material suppliers and packaging machinery makers have done along these lines should be helpful to others who have not yet solved their packaging problems. So FOOD INDUSTRIES editors have rounded up some of these experiences and are passing them on to their readers in this article. In reading the material that follows, keep in mind that it has been classified in accordance with the substitute materials used. For example, when a package has had to be changed from foil to a paper box combination, the item appears under paper boxes.

Glass Containers

While the glass container manufacturing capacity of the country is definitely limited because of numerous barriers that exist to any great expansion, more glass will be available for food packing this year and in 1943 than was the case in 1941. Glass production will expand to some extent and, also, glass will be shifted to food packing from certain less essential uses. In addition, the use of larger sizes of containers, made in a relatively few standard sizes and shapes, and with less weight of glass in container walls, will permit of an output that will take care of a considerable part of the pack of heat sterilized foods formerly packed in tin cans.

Apparently, such quantities of new milk and beverage bottles as will be needed will be available. Standard shapes and sizes are being worked out by these industries in collaboration with the Bureau of Standards. This should result in considerable saving, making the tonnage of glass available for the purpose go farther.

Preserves packed in the Army 2-lb. jar with gold lacquered band cap.

Packers of honey, sirup and molasses, formerly using tin cans, are going to glass for their smaller sizes of containers, as the tin restriction order (see p. 49) permits these products to be packed in tin cans only when the contents is 5 lb. or over in weight. The glass containers used for these products are the proposed "Economy Line" plain round jars (see p. 44). Also where these products have been packed in fancy glass jugs, containers of the same "Economy Line" are being used.

Many products such as pork and beans, spaghetti, corned beef hash and similar foods, for which tin cans are now withheld by government order, will probably appear in glass.

Glass will be saved in the packing of many products that now use it, including jams, jellies, peanut butter, pickles, mayonnaise and salad dressing, by the elimination of the tremendous variety of jar, bottle and tumbler shapes now used. Plans now under way will result in standardization on a few plain round thin-walled shapes.

Caps and Closures

Intimately tied in with the use of glass containers is the matter of caps and closures. These have been particularly hard hit by shortages and restrictions. Most caps and closures in the past have been made of tinplate, aluminum (now restricted) or plastics (partly restricted). In addition, they have used in many cases liners of cork, foil, or both and gaskets or sealing rings of rubber or rubber composition. All of these materials are now definitely out, or are closely restricted.

However, experimental work completed or now under way by closure manufacturers and chemical concerns has already resulted in the production of closures and caps that are made entirely of other materials. Such things as black iron closure bodies, specially treated paper liners and substitute composition gaskets are already undergoing consumer tests and promise to solve these cap and closure problems even if they are not quite as good as the closures made in peace time. Where such caps are used, the black iron will undoubtedly be treated to prevent rusting and then coated with lacquer or enamel.

Milk bottle caps and hoods represent a somewhat different problem. Here, aluminum is no longer available, but hoods and disk caps of paper can be obtained in sufficient quantity. Cellophane for hoods is also available under the present WPB order L-20, for those concerns that need to use it.

Paper Cups, Bottles and Containers

Restriction of the use of tin cans to those products where they are considered essential, combined with the fact that glass containers to replace tin are only available in limited quantity, makes it necessary for many of those who have packed in tin to seek other containers. Generally speaking, products in this class include all those formerly packed in tin or glass that do not need to be heat sterilized or hermetically sealed. Dry products like baking powder, tea, spices, cereal products and cocoa fall in this class; cheese, where formerly packed in glass, is another type of product in this group, as are dried beef and various other meat products, some fish products, shortenings, popcorn, various biscuits, dehydrated foods, even jams, jellies, sirups and honey (where the products do not need to stand severe shipping conditions or long shelf life).

Probably the greatest use for liquid-tight paper containers is in the distribution of milk. This is a well-established practice and can be extended, so as to make more glass available for other necessary purposes.

Certain of these paper milk bottles are suitable only for milk, but other designs can be used with other products, where the food does not need to be heat sterilized after packing and will pour from the container. For example, some are considering the use of such a container for vinegar and similar products.

Cups and cylindrical liquid tight containers are now under consideration as substitutes for tin cans and glass for many food products. Other countries are ahead of us in this matter, for New Zealand already packs honey in paraffined paper cups with a special type of cap and in Great Britain these containers are in use for jams, jellies, fish, fats, sirups, meat products and many other foods, including even meat extract and mincemeat. Cottage cheese has long

From Switzerland comes a package called the "Zipper" container. This container, in any size, is made of stiff, heavy wax paper. The stitching around the top, to which a small metal button is attached, serves as a means of opening the container. In Switzerland it is used to package fats and powdered dry foods and similar products that must be kept dry.

This container is known as the "Bandcan" and is made with fiberboard walls and metal ends that can be hermetically sealed. It uses special coatings on the inside to prevent metal contact with food and can be used where the cooking process is one of pressure cooking rather than immersion.

been packed in this country in such containers and now they are being considered for other cheeses.

One advantage of this general type of container is its great saving in weight. Empty, the weight averages 88 percent below glass, while when filled the weight saving is also great. No separate labels or labeling operation are required. Space is saved by using this paper product. Also, these uses eliminate breakage losses and avoid the necessity of glass container washing.

For quick frozen vegetables, fruits, meat and seafoods, liquid-tight cup and cylindrical containers are already in use and this use can be extended to replace other, scarcer materials.

Paper containers of these types are being considered by many and will undoubtedly soon appear on the market with many products. Only two facts prevent even wider use of these containers. First, the manufacturers have been operating under peak demand for some time. Although they are increasing their capacity, they may not be able to catch up with the demand for a while. Second, because supplies of high grade paper and of wax have been and are in great demand, it may not prove possible to accommodate all prospective users.

Combination Metal and Paper Containers

Paper-walled containers with metal ends, either cylindrical or rectangular in shape, are finding acceptance by some food packagers. In this class of container, the ends are made of coated "black iron" or steel sheets in place of the tinplate formerly employed. Among the products now going into this type of container are flours, baking powder, popcorn, tea, spices, bicarbonate of soda, cereals, cocoa, and dehydrated foods. One manufacturer of dog food, formerly a large user of tin cans, now dehydrates his product and packs it in metal-ended cylindrical paper cans. A large producer of baking powder has also gone to this package.

Paper Boxes and Folding Cartons

Food products of many sorts have long been packed in various types of lined and unlined paper boxes and folding cartons. Now other food producers, who formerly used all sorts of packages, from foil wrappers to tin cans, are going to this type of package.

One fact that prevents the use of this package in many plants that otherwise might have adopted it is the difficulty of getting some liner materials, for example, "Pliofilm" and moistureproof cellophane. However, new laminated sheets of high moistureproof quality, treated glassines and vegetable parchments are proving to be serviceable substitutes for these scarce liners. One type of container now being adopted is prefabricated and prelined, has highly protective characteristics and is suitable for packaging a variety of dry and semi-liquid products, ranging from frozen to dehydrated foods. With a special machine, a hermetic end seal is automatically produced.

In some cases, paper boxes are replacing foil package. For example, a well known brand of tea, formerly foil-wrapped, is now going into glued end folding boxes of $1\frac{3}{8}$ oz., 2 oz. and 4 oz. sizes. These attractive little boxes are made of clay-coated boxboard.

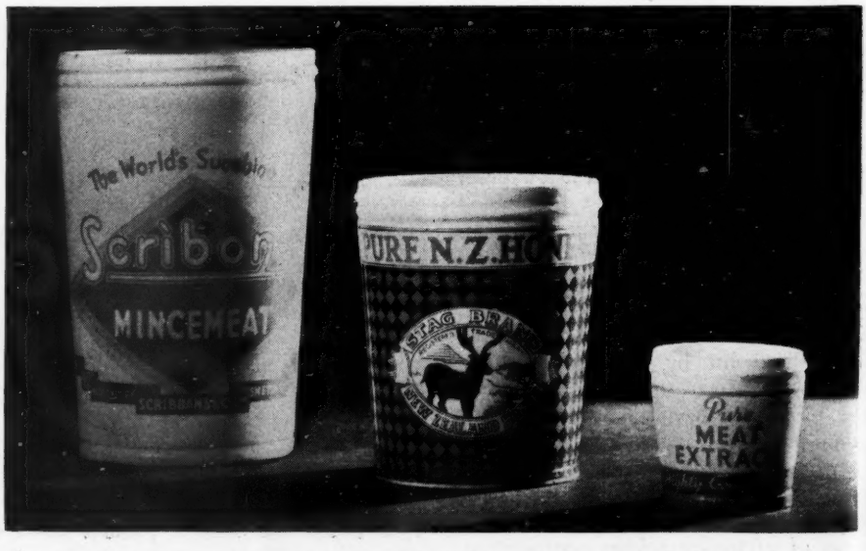
In some cases, heat-sealed, moisture proof and grease proof bags inside of boxes or folding cartons are replacing cans for wet or highly sensitive foods. One of these already on the market is a highly moistureproof hermetically sealed liner inside a box, used to package milk concentrates formerly packed in tin.

Another use of the folding carton is in substituting a window carton for a plain one, thus making the labels on the bottles inside the carton serve two purposes.

Paper Bags

General tightening of the whole packaging material supply situation is forcing many food packagers to use paper bags to replace former materials. Perhaps the most spectacular substitution of this nature is the replacement of burlap and other fabric bags by paper bags of either the multiwall or laminated, specially treated kraft types. Such bags are now being used for flour, sugar, potatoes, meal, feeds, seeds and fertilizers. While the kraft paper used in making them is not too abundant, kraft is under an informal quota arrangement, which promises to make enough available to meet the needs of the food field for bags.

Small paper bags, such as ordinarily used for the grocery trade, for sugar, flour, coffee and other dry foods, will probably find more extended use, as one expedient being adopted by producers of dry foods to meet the packaging situation is to pack in bulk, with consumer distribution in small bags, a



Specially treated waxed paper containers have been used extensively in other countries for many years. Honey, sirups, jams, jellies, meat and fish are a few of the products packaged in this container.

practice similar to that long followed by some super-markets. To make the small bag supply serve the widest possible food needs, users of various kinds of bags are attempting to standardize on size and to conserve materials.

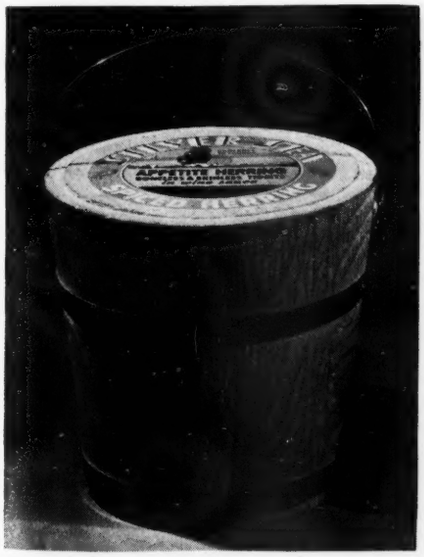
Finally, bags are being substituted for fiber shipping cases by some food packers. Multiwall bags are used for this purpose.

Wrappings

Wrapping papers, fabrics and foils have been standard packaging materials for many food products for many years. With foils not available, except for some "composition" foil, burlap unavailable, and other fabrics not too plentiful, paper wrapping is finding extended use. One large meat packer, for example, is experimenting with a wrapping of laminated kraft and fabric, the one wrapping sheet replacing the usual inner wrapping of stockinet and the outer muslin wrapping, saving both material and labor. Paper is replacing burlap in other meat wrapping operations.

Foil wrappings are also being replaced by paper wrappings. One candy manufacturer is using wax paper to substitute for foil, while another is using a laminated waxpaper and printed glassine that looks much like foil for wrapping candy bars. Another food packager, who makes a fresh dough product, uses a specially treated, laminated cellophane to replace foil. Treated glassine also is replacing foil.

Where substitutions are made, it must be remembered that machines built to wrap with foil must be largely rebuilt to accommodate the new materials.



Wood is again coming to the fore as a material for food packages. Here it is used for spiced herring.

With wrappings in general, it must be kept in mind that paper is not too plentiful. Wrappings used should be as light as they can be and still give adequate protection. Use of larger unit packages and the cutting down of folds and laps will also save material.

Transparent wrappings of the plastic type are out altogether, as is the case with "Pliofilm" and "Koroseal," or are in short supply, as is the case with cellophane. However, some cellophane is available for food products, and its limitation for use in wrapping many non-foods should enable some food packagers to substitute transparent wrappings for former materials.

Cellophane and cellulose acetate transparent wrappings are available for wrapping fruits and similar products that must "breathe" while packaged. Cellophane is being considered also by packers of coffee and dog food. Frozen fish and other frozen foods are being packed in cellophane. Specially treated cellophane is now being used to wrap oven-ready biscuits, replacing foil. Cellophane bags are finding wider use as candy packages.

Glassine wrappings are now mostly going to the food industry and are being used to substitute for other protective wrappings.

Box wrapping papers are available in wide variety, though the coated type is hard to obtain because of casein shortage. Wax paper wrappings, as used on bread and other bakery products, are likely to be obtainable throughout the war because of their protective qualities, but the size of unit-priced baked goods may be reduced in order to conserve waxed paper. Also, on some large institutional packs of frozen foods, the outer waxed paper wrapper is being eliminated, although this type of outer wrapping is being continued on the smaller sizes.

Black Iron Cans

As yet, no food manufacturer reports the use of black iron cans as a substitute for tin cans as food packing, and, apparently, it may be some time before these are available. At present, there is considerable uncertainty as to how far black iron will substitute for tinplate for, even with suitable enamels, there may not be sufficient protection for the more acid foods like tomatoes. A full discussion of the black iron can will be found on page 41.

Paper Shipping Containers

Solid fiber shipping containers are scarce because a large part of the output is used by the government. However, as the production facilities of

These prefabricated, prelined containers have extremely high protective characteristics and are suitable for packaging a variety of food products both dry and semiliquid, ranging from frozen to dehydrated foods. Fresh dough and concentrates are some of the foods being packaged in these.

This product was originally in a foil-wrapped package but now uses glue-end folding boxes.

Containers such as the one shown above are used for packaging foods where protective liners are required. This is made up of a paperboard carton with a greaseproof liner.

Waxed paperboard containers used for packing frozen foods

many industries are converted to war work, the demand for these containers for non-food civilian uses will lessen. There then should be more available for food packing. Meanwhile, corrugated containers are in part substituting for solid fiber containers, with wooden shipping cases and multiwall bags also being called into service.

Recent changes in Rule 41 of the consolidated freight classification makes possible in many instances the use of lighter weights in making solid fiber and corrugated cases, thus saving material. Corrugated containers are replacing other methods of packing fish in one concern. Also, a maple sugar company has adopted them in place of former shipping cases.

Wood

Wood is again coming to the fore as a material for food packages. A number of concerns are using wood in place of solid fiber shipping containers. Dairies are going back to wooden bottle cases in place of metal cases. Bakeries are substituting returnable wooden crates for fiber cases.

Tight cooperage such as barrels, kegs, firkins and kits, is again in great demand, particularly for use in bulk packing operations that are being substituted for canning with some foods. For example, sauerkraut makers are turning to tight wooden barrels.

Adhesives

There is no shortage of adhesives, but many substitutes for materials formerly used are now being employed (see article p. 47). Silicates for carton sealing are so far amply available. Tapioca starch, widely used in dextrine adhesives, is no longer coming to us from the Far East. But available supplies are being eked out with corn dextrine. Latex adhesives and rubber dispersions are out, being replaced in part by synthetic resin emulsions. In many cases, substitutes have had to be found for substitutes, but so far all needs have been met.

A Final Caution

In contemplating the use of a substitute method of food packaging, the packaging machinery situation must be taken into account. All new machinery of this class is difficult to get and is rapidly becoming more so, as machinery firms convert to 100 percent war work. Packaging changes should be made, where possible, so that they can be accommodated on existing machines, perhaps rebuilt, or on used machines. Even the highest of priorities hold little promise for early delivery of new equipment.

It is often best to go immediately to the simplest form of packaging possible. This is well illustrated by the experience of a packer of dried fruits. Even before Pearl Harbor, he had changed his packaging to the simplest of fiberboard boxes and paper bags, in the fewest sizes possible. As far as can be foreseen, this packager of foods is all set for the duration. His example is one well worth copying.

Shipping Case Seal Which Permits Reuse

Pieces of chipboard are glued between flaps. When case is opened, the chipboard pulls apart, leaving the box flaps intact. Cases sealed in this manner can be reused many times

A NOVEL method of sealing corrugated and fiber shipping cases so that they can be opened without destroying the flaps, and subsequently knocked down and reused, has been suggested by the National Adhesives Division of National Starch Products, Inc. Developed strictly as a conservation measure during the present scarcity of shipping containers, it has been looked upon with favor by several leading manufacturers of shipping cases, as well as a number of large shippers who see in it an immediate answer to a serious problem.

Briefly, the method consists of gluing strips of ordinary chipboard to the inner surfaces of the long flaps of the shipping container. The chipboard strips are the same width as the flaps,

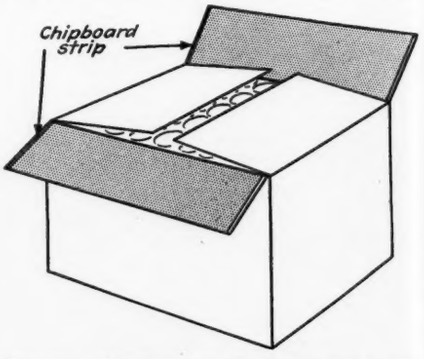


Diagram showing how chipboard strips are placed on the inner faces of the case flaps. The strips are the same width as the long flaps, but are a fraction of an inch shorter.

but a fraction of an inch shorter, so that the slight additional thickness will not throw the flaps out of a true horizontal position when they are closed.

From that point on, the cases can be sealed by regular gluing methods. The exposed surface of the chipboard is glued, either by hand or by a case-sealing machine, and adhered to the kraft surface of the short inner flaps of the case.

When the case is opened in the normal way, the plies of the chipboard separate, without damage to the flaps themselves. Because of its lower ply strength, the chipboard serves as a tearing zone, and so permits reuse a number of times. If the chipboard flaps are applied to both top and bottom, the case can be knocked down when empty, thereby facilitating return.

The timeliness of this suggestion has been commented upon by several large chain outlets, who are even now offering premiums to their store managers for the return of shipping cases in good condition. Under existing conditions, however, many of the cases so returned have been so mutilated in opening them that they are unfit for further sealing. This method of sealing is intended to eliminate this condition.

Further particulars can be obtained from National Starch Products, Inc., 820 Greenwich St., New York. During the present emergencies, the company will license any interested company to use this process without cost or obligation.

Outlook Serious for Metal Containers—Will Improve in 1943

By L. V. BURTON
Editor, "Food Industries."

Situation not as bad as many fear. Can manufacturers have pooled technical resources to meet wartime packaging problems. May be some delay before substitute tinless containers are widely available

METAL containers of the rigid type, as contrasted to foil containers, present a complex situation that is particularly serious for the remainder of 1942, but is not nearly as bad as had been anticipated when the tin conservation order, M-81, was imposed by the War Production Board. In brief, there is expected to be a delay in replacing tin-coated steel containers (where their use is prohibited by M-81) by the various forms of tinless containers, but this delay is of predictable duration instead of being hopelessly indefinite.

Bare-steel and enameled-steel containers will become available in a matter of weeks or months where their use is technically possible, such as for packaging dry products. A moderate amount of these steel containers is available at present. For packaging dry products, a reasonably quick shift from tin-coated to tinless steel, enameled or bare, can be made. Yet it should be realized that such changeover must perforce be made gradually, not suddenly for even though "black" plate is in moderate use today the conversion of many lines of can-making machinery from tin-coated steel to bare steel or enameled steel requires a definite amount of time.

Reasons for Delays

Reasons for delays in producing tinless-steel containers for other than dry products extend clear back to the steel mills. Furthermore, there is need for extensive food processing tests in the new types of containers before they can be released for commercial use. So there is little expectation of other than test uses of "Bonderized" plate in 1942. This form of container is not likely to be generally available until 1943 for processed foods.

Steel mills which manufacture and roll the steel sheets are now installing the facilities to permit the manufacture of steel sheets to be known as "K" plate, coated with iron phosphate —the "Bonderizing" process. Only one such Bonderizing installation was functioning on March 1, located at the Gary, Ind., works of Carnegie-Illinois Steel Co. It is now operating at capacity, and as others come into production they will contribute to the total available supply of Bonderized plate. But, until they are all operating, the supply of Bonderized plate must be rationed as equitably as possible. Hence a tight situation is to be expected for a time, yet it is probable that the complete changeover to Bonderized plate from tinplate will be made by mid-Autumn, barring major mishaps.

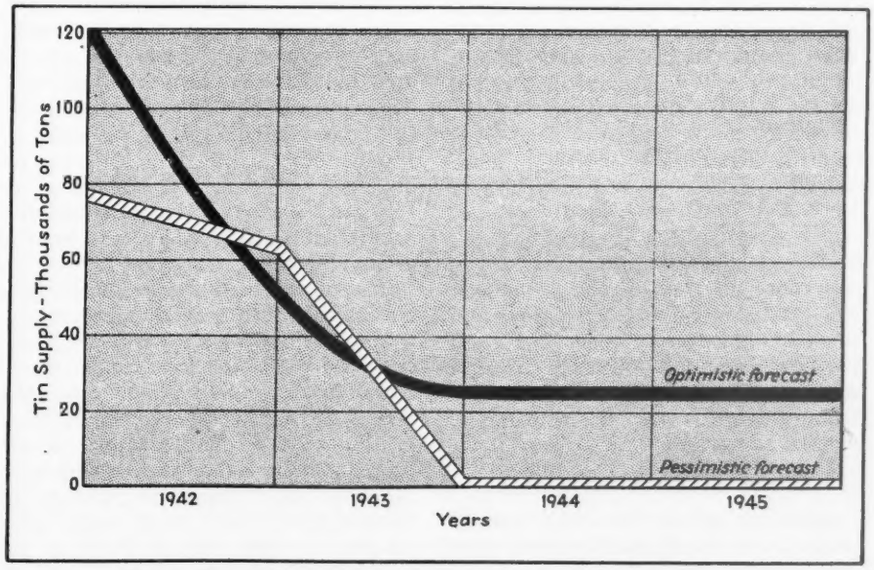


Fig. 1. Two views of our dwindling supply of tin for civilian use

It is believed that supplies of canned foods already in the trade, plus the quantities for which tin cans are still available, plus the little that can be produced in the newer types of metal containers until the changeover is completed will be ample to take care of civilian needs. But can manufacturers are not making any predictions, nor promises.

During the war there will be four types of materials for rigid metal food containers—tin-coated steel, both hot-dipped and electrolytic; Bonderized "K" steel; and black steel. The latter two require a secondary coating of an organic material in nearly all uses. Terneplate containers, also available, are not suitable for foods.

Tin Supply Believed Ample

For those food containers in which tin-coated steel is indispensable, it is believed that, added to the 120,000 to 150,000 long tons already on hand, enough tin will be coming into the United States from Nigeria and Bolivia, plus reclaimed tin, to meet requirements until the end of the war. Such a supposition is, of course, predicated on the ability of the United Nations to protect their ocean-borne traffic. Hence, those who are farsighted will watch the progress of ship sinking.

WPB apparently, and properly, takes the most pessimistic view of the situation, while industry hopes for all the breaks, and may get them. (In war it is imperative to be prepared for the worst.)

The amount of tin expected to be available in the United States for food containers and other uses, is shown in Fig. 1, one curve representing the pessimistic outlook, the other the optimistic forecast. According to the WPB view, there will be very little tin available to civilian uses after Dec. 31, 1943. There would have been more except for the necessity of taking out substantial amounts to share with our Allies. According to the industry view, however, the amount of tin available will be 25,000 to 30,000 tons per year during 1944 and 1945 or as long thereafter as the war may last. Further research is likely to develop more ways of getting along without tin—a factor that will go far in offsetting any losses of ships bringing tin ore concentrates to the new Texas City, Tex., tin smelter which is expected to go into operation this spring with an enlarged capacity of 30,000 tons.

Status of Tin Reclamation

Recovery of tin from can makers' scrap is an established industry that has been economically self supporting for 30 years and has reclaimed about 8,000 tons of secondary tin per year. Its future, of course, will depend on the amount of tin remaining on the scrap, which is to be a diminishing figure because of reductions in the weight of tin coatings from the customary 1.5 percent—first to 1.35 percent for what was termed "OPM plate," then to 1.25 percent for "war plate," and in the future to something approaching 0.5 percent for electrolytic plate.

An essential economic factor for this industry is the existence of considerable amounts of tin scrap or clippings at a few localities where the cost of assembling it is thereby made small. In contrast to this, however, is the problem of assembling used tin-coated containers from the millions of homes throughout the land, a problem that has recently received a 5-year test by Metals and Thermite Corp. at a pilot plant in San Francisco having a capacity of 6,000 tons of used containers per year. The corporation has found that for each ton of discarded cans (presumably the old 1.5 percent tinplate) it can recover about 24 lb. of tin oxide and nearly a ton of scrap steel, both of which are particularly useful at the present time. According to the corporation's statement, 1,000,000 tons out of the 2,750,000 tons of cans used annually can be economically centralized and the metals recovered. This would require construction of a dozen or more reclamation plants in large cities, plus suitable cooperation of housewives in keeping discarded cans separate from garbage. From such plants it is calculated that 1,000,000 tons of old cans would yield about 11,000 tons of tin and 900,000 tons of scrap steel. Wartime necessity makes this a feasible project, but it is not likely to be operative for perhaps a year or two.

On the other hand, Vulcan Detinning Co. is ready to buy carloads of used tin cans that have been properly washed, ends cut off, labels removed and bodies flattened. It is now offering $10 per ton delivered to its plant in Sewaren, N. J., and $12 per ton at its Pittsburgh plant, and is reported to have been buying used No. 10 cans from a soup manufacturer.

The quality of the recovered tin will be equivalent to that of Straits tin—the best there is. Recovered steel, however, will not be tin-free, for the alkali detinning process cannot get into seams. Steel makers' objection to tin-bearing steel in normal times is removed during the war emergency. Nevertheless, those who indulge in long-range thinking must realize that tin-bearing scrap steel is likely to be remanufactured into tinplate and not into other products, thereby making the tin impurity cumulative. In any event, tin impurities in steel become cumulative. Above 0.5 percent tin content, steel is definitely undesirable. Therefore, such recovery can be considered practical only for a few years at most.

Some tin is being reclaimed from used cans. Housewives have been asked in some cities to wash the empty cans, remove labels, cut the ends off, flatten the bodies and put the containers aside for collectors.

Technical Factors Of New Metal Containers

Aggressive research by metal container manufacturers has developed methods of rapid soldering of side seams of various types of cans, even where they lack the tin coating that heretofore has been indispensable to rapid soldering. Some further research still remains to be done on soldered black iron containers for processed foods. This new development is to be made available to all in the container industry during the war emergency, and because it permits can making operations to proceed at normal body-maker speeds, it eliminates an important obstacle to the manufacture of adequate supplies of metal containers.

"K" Bonderizing is a treatment of a clean steel sheet with a solution of zinc

dihydrogen phosphate which produces an adherent film of mixed iron and zinc phosphate. The amount of zinc available for the process has been studied and found adequate, despite WPB restrictions on the use of metallic zinc. It is only because zinc concentrates are used without reduction to the metal for making the Bonderizing pickle that this problem is not acute.

For all uses, Bonderized plate must be coated with either one or two coats of organic enamels. The functions of the Bonderized film are threefold: (1) To secure adequate adhesion of the organic films; (2) to eliminate "underfilm" corrosion; (3) and to reduce corrosion to minute discontinuities in the organic film.

Enameled steel plate can be used for containers for dry products and also many non-food liquid products such as lubricating oils. Black plate (deoxidized black plate) cannot be used successfully without a protective coating of some sort because of the rusting problem. Moreover, on account of the latter, the can maker faces difficulties in transporting the deoxidized black sheets from the steel mill to the can factory, and is forced to oil the sheets to avoid inevitable rusting, then bake the oil off before a protective enamel may be applied. All this adds to the container cost in a manner not easily discernible.

Another factor in the manufacture of rigid metallic containers which is not easily foreseen by the user—a factor both in costs and in delaying complete changeover from tinplate to tinless plate—is the need for cleaning the edges of the body blanks where they are to be soldered. When it is realized that only clean, bare metal can be soldered, it is at once apparent that any oxide, phosphate coating, enamel or lithography must be removed from the blank before it may be formed into a can body for soldering. This cleaning operation necessitates building a special gadget for its accomplishment on each body-former where tinless packers cans are made.

Enameling Problems

Coating black and Bonderized plate with an organic coating for secondary protection also introduces many new problems. These must be understood by all whose business depends on the rigid metal container for packaging if they are to comprehend the delays that may be experienced in the coming months. New coatings have had to be developed, for the complete stoppage of tung oil from China and perilla oil from Manchuria and the irregularity of arrivals of imported gums by ship preclude dependence on older formulas. It is said that there is no need to worry about this problem now with general-line cans for only domestic materials are used in the newer formulas; but for packers cans some can makers feel that the best substitute for tung oil has not yet been found.

Solvents for dissolving the enamel prior to their application are stated to be available now in adequate amounts.

Ovens of the conveyor type for baking the enamels are needed in quantity, and though many container manufacturers have additional ovens, both on hand and on order, there is bound to be some delay before the industry is completely supplied. Every effort is being made to coordinate their delivery to can makers with the installation of Bonderizing equipment at steel mills and the solder margin cleaners on body makers at can factories, yet it would be a miracle if the priority problems of the nation did not get something out of proper synchronism.

Were it not for the comparatively recent development of low-metalloid cold-reduced plate (L-plate) the current tin situation would have been a very grave problem indeed, for Bonderizing is at its maximum protective efficiency when applied to L-plate. In spite of its merits, Bonderized steel must be given at least one coat of an organic enamel and, for some services, two coats before the sheets can be fabricated into containers. In this respect, however, it is not radically different from tinplate which is enameled or re-enameled for many food product containers.

General-line cans, *i.e.*, cans for products not sterilized by heat, are already being made from enamel-coated black plate. Coffee cans for vacuum-packed coffee have had enameled black-plate ends and even black bodies for several months, likewise many non-food containers such as tobacco and oil cans. All of this has contributed considerably to the conservation of tin.

Special Problems of Packers Cans

For packers cans—those cans used for foods to be sterilized by heat—the problem of utility is a bit more complex and depends on the acidity of the products to be packed. At pH 5 or below (the acid fruits) it appears that some tin must be used on the steel, but this may be electrolytically deposited in amounts as low as 0.5 percent. Yet this electrolytic plate must be enameled at least once and perhaps twice. Can makers feel very sure on this point.

For products of pH 5.5 and higher the can makers feel safe in offering enameled and re-enameled Bonderized plate for food containers.

But between pH 5.0 and pH 5.5 there is a zone of acidities which presents a number of problems. While it is well known that tin will serve perfectly as the protective coating in this zone, the tin supply is definitely limited by the Japanese invasion of Far Eastern sources, and hence it is imperative to avoid the use of tin in this zone wherever possible. Aggressive research is under way to learn whether Bonderized plate will serve between pH 5 and 5.5.

Most meats, fish and many vegetables (but not tomatoes) fall in the pH 5.5 and higher zone and can be packed in enameled Bonderized-plate cans as well as in ordinary tin cans. It is definitely known that concentrated fruit products and tomatoes of pH 5 and less must have tinplate. How soon it can be learned what material must be used between pH 5 and 5.5 is anybody's guess. In this group are products with tomato sauce, pimentoes and certain vegetables. In the meantime, even on the most conservative WPB estimate, the amount of tin on hand will last to the end of 1943 under the restrictions imposed in the M-81 order. Therefore it is not anticipated that there will be any stoppage of packing of permitted products in the twilight zone.

Up to this point there has been no mention of the steel situation. Yet even this must not be overlooked by those who are planning their operations for the future under wartime conditions. Steel is a commodity that is definitely short, and while Washington has shown no signs of cutting down the amount going into food containers, it is very much aware of the fact that about 2,750,000 tons of steel was used in tin cans in 1941. Can makers are studying the possibility of using still thinner gages of steel sheets, which would reduce the total tonnage needed, but are handicapped by the fact that low-metalloid steel is definitely softer than high-metalloid or ordinary steel. Efforts have been made to secure additional stiffness by modifications of structural design (unobservable to the eye), but there is still room for further progress.

To sum it all up, the metal-container situation is nowhere near as bad as many have feared, largely because of the willingness of can manufacturers to pool their technical resources and cooperate to the end that wartime packaging problems may be adequately met. But it must also be recognized that there is bound to be a period of weeks or months before substitute containers will be available to all who are not on the preferred list on conservation order M-81.

Glass Containers Simplified To Save Scarce Materials

The tin can situation is throwing a heavy load on glass containers. And there will be a shortage unless this type of container is used efficiently. Limits are imposed by manufacturing capacity, closures and sealing materials. "Economy" glass jars coming for many foods

INCREASED simplification and standardization of glass containers is going to be necessary as the supply of raw material for the manufacture of glass becomes more difficult to obtain. In addition to this, the manufacturing capacity is limited. It seems as though there will be very few additional plants built because of the limited availability of high grade refractories (tank blocks) that are required for constructing the glass tanks. The Division of Simplified Practice, National Bureau of Standards, U. S. Department of Commerce, Washington, D. C., is now working with the Design and Simplification Committee of The Glass Container Association on a program that in the end will eliminate glass containers of odd sizes, shapes and finishes.

Production Capacity

In the last 12 years the shipments of glass containers were more than doubled. The shipments in 1929 totaled 33,000,000 gross, while in 1941 the total was 70,800,000 gross. The theoretical production capacity for 1942 is 80,600,000 gross, with actual production estimated at 81,900,000 gross. These figures indicate that production in 1942 is to be pushed above a theoretical limit. Actual production can be broken down as shown in Table I and Table II.

If operations seven days a week were permitted in all areas, the 1942 production figure might be raised to 85,000,000 gross. There is a possibility that production could be raised another 2,500,000 gross if old plants were rehabilitated and put back into operation. If there were not enough food containers under normal operation, A-1 priorities could be established for food containers before the glass container manufacturers could make any jars or bottles for non-food use.

Simplification Plan

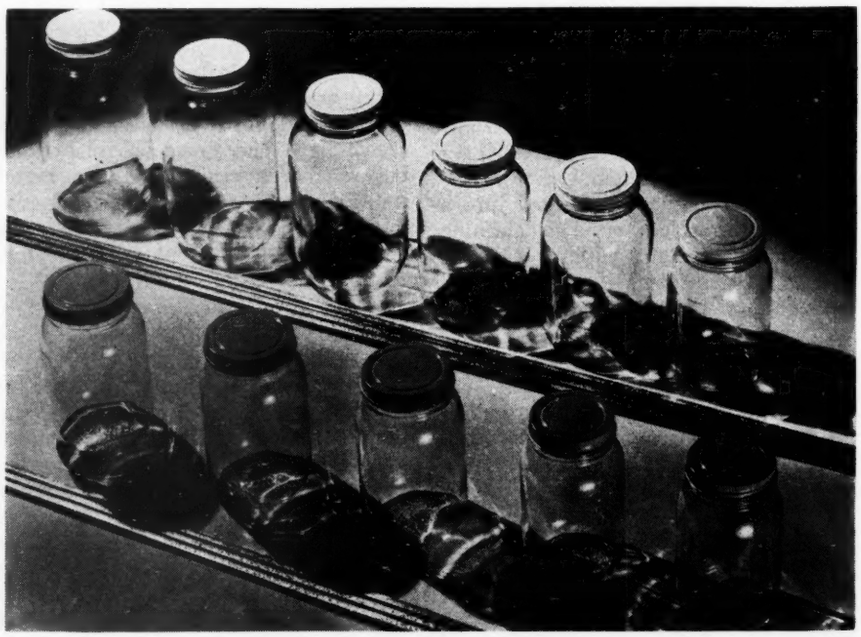
The Glass Container Association has designed a line of simplified glass jars. These containers are illustrated in the accompanying photograph and their specifications are given in Fig. 1 and the accompanying table of dimensions. This type of jar is called the Economy Line Plain Round Jar. These first jars were designed for such products as preserves, jams, jellies, fruit butters, peanut butter, mustard, pickles, relish, mince meat and honey.

If these jars are used by the packers, it is estimated 25 to 30 percent less glass will be used than is required to make the glass containers now in use. The ratio of jar width to height permits the most economical packaging, which results in a saving of paperboard. A saving of from 20 to 40 percent in the materials used for closures is possible if this type of container is adopted. There have been numerous comments on the possibility of using the Mason jar finish so as to enable the jars to be reused in the home for canning and preserving foods. However, this problem has not been settled at the present time.

A satisfactory policy is being formulated with respect to private molds. It has been suggested that when new molds are required that they be limited to the Economy Line. If the private molds do not contain any more glass than the Economy Line, replacement of private molds would be permitted as needed.

Eleven sizes of the Economy Line have been standardized, and industries using this type of container have been requested to select the fewest number of these sizes with which they can operate comfortably. After studying the reports from the food manufacturers an Emergency Simplified Practice Recommendation will be issued.

In addition to the specifications presented here, other specifications will be issued in the near future covering recommended standards in the Economy Line for milk and cream bottles, cottage cheese and sour cream jars, wide-mouth vegetable and fruit jars, half-gallon, No. 10 and gallon wide-mouth plain round jars, narrow-mouth round stubby juice bottles, narrow-mouth half-gallon and



Fancy shapes and sizes of glass containers will be replaced by a few sizes of a simplified design to save glass, metal (in closures) and paperboard (in cartons). Here is the Economy Line of jars designed by Glass Container Association and proposed by the government for foods such as preserves, mayonnaise and peanut butter. Similar simplified designs probably will be extended to milk bottles, packers jars, juice bottles and jars and catsup bottles.

gallon jugs, containers for distilled spirits, wines, beer bottles, bottles for carbonated beverages, tumblers and pails.

Due to the tin conservation program, many large-size glass containers are needed to replace the large tin containers. The next sizes to be announced will probably be half-gallon, No. 10 and gallon-size containers. Specifications for the narrow-neck juice bottle and the packer's line of wide-mouth vegetable and fruit jars are to be issued in the near future also. From all indications these jars will include sizes that can be run on No. 2 and No. 2½ can lines.

Industry Reactions

The Peanut Butter Manufacturers Association was the first industry to ask for a mandatory order using the Economy Line Plain Round jars. This group requested that the packaging of peanut butter be restricted to three different sizes of those jars shown in Fig. 1, namely, jars having 8⅜ fluid ounce, 15¼ fluid ounce, and 30½ fluid ounce overflow capacity. This was a voluntary action by the Association and it was requested that all manufacturers of peanut butter adhere to these three sizes.

TABLE I—Estimated 1942 Production of Glass Containers.

80,600,000—Gross, total
- 30,400,000—Food use, including milk
- 23,300,000—Medicines and toiletries
- 21,600,000—Beverages, including soft drinks
- 6,600,000—Miscellaneous items

TABLE II—Actual 1941 Production of Glass Containers.

70,863,000—Gross, total
- 24,000,000—Food use, including milk
- 20,400,000—Medicines and toiletries
- 21,600,000—Beverages, including soft drinks
- 4,800,000—Miscellaneous items

Due to the fact that large-size tin containers are no longer available for packaging peanut butter, large-size glass containers will be used. Investigation within the industry disclosed the necessity for large-size glass containers to serve the institutional, hotel and restaurant trades. Four-pound, net weight, No. 10 and gallon glass containers are the sizes recommended by the Peanut Butter Manufacturers Association to fulfill the larger size requirements. In the case of the larger sizes, cap diameters larger than those specified for the smaller size Economy Line are essential. Without a wider opening a heavy-bodied product such as peanut butter could not be removed from the container. It is believed that large savings in metal will be made by the use of these larger size containers.

A comparable program is planned for the National Preservers Association. Various sizes of containers have been unofficially proposed for adoption to conserve materials. These containers are for packing preserves, jams, marmalades, jellies and fruit butters.

Preserves, jams and marmalades would be packed in jars having 12¼ and 24¼ fluid ounce overflow capacity. Actual contents would be 1 and 2 lb., respectively. Larger size glass containers, patterned along the same style as the jars in Fig. 1, would hold approximately 4 lb., 8½ lb. and 10½ lb. of preserves, jams and marmalades. Presumably the No. 10 and 1-gal. containers would be used to pack the 8½-lb. and 10½-lb. sizes.

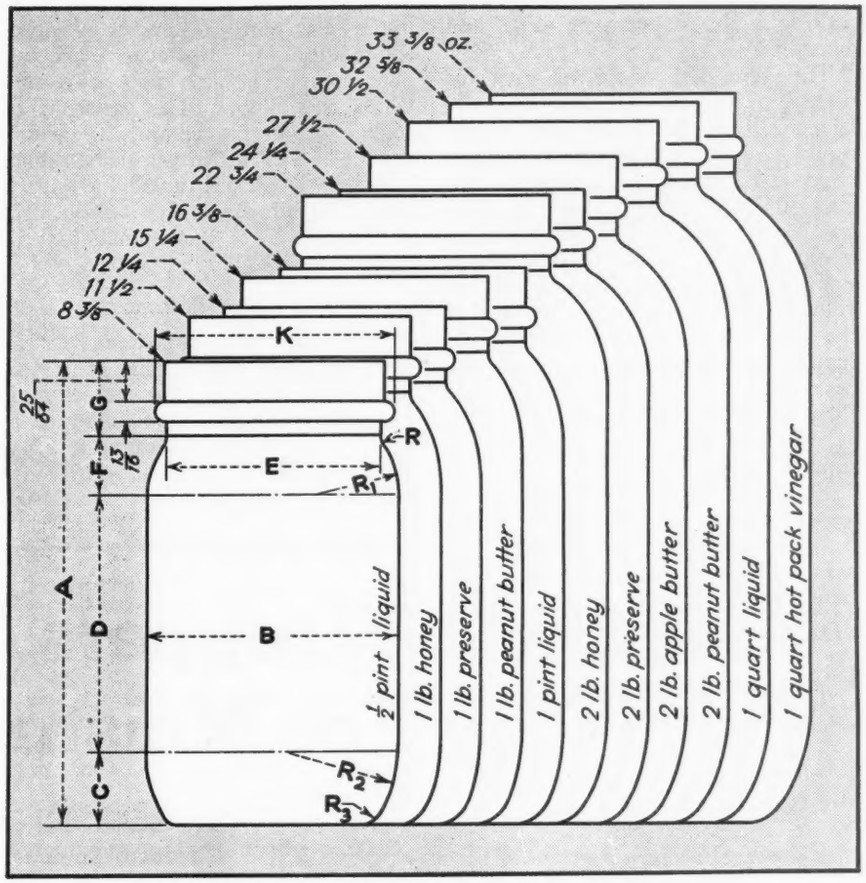


Fig. 1. Diagrams and dimensions of the proposed Economy Line of glass containers. See accompanying table for additional dimensions.

Dimensions of Economy Jar

(The letters refer to those on drawing)

Kind and Quantity of Food To Be Packed	Capacity overflow	Weight	A	B	C	D	E	F	G	K	R	R1	R2	R3	400 Finish Size
½ pt. liquid	8⅜ oz.	5	4 3/32	2.512	1 1/16	2 3/16	2.125	3/32	1/16	2.312	1/8	5/8	1 1/8	7/32	58 mm.
1 lb. honey	11½ oz.	6⅛	4 23/32	2.750	1 1/32	2 7/8	2.125	7/8	1/16	2.324	1/8	1¼	1 5/32	¼	58 mm.
1 lb. preserves	12¼ oz.	6½	4 23/32	2.781	1 1/32	2½	2.125	7/8	1/16	2.324	1/8	1 13/16	1 5/32	¼	58 mm.
1 lb. peanut butter	15¼ oz.	7½	5 1/16	3.010	1 1/32	2 11/16	2.375	1/32	1/16	2.562	1/8	1 3/8	1 21/32	¼	63 mm.
1 lb. liquid	16⅜ oz.	7⅞	5 3/32	3.090	1 1/32	2 21/32	2.375	1/16	1/16	2.562	1/8	1 5/16	1 21/32	¼	63 mm.
1 lb. honey	22¾ oz.	10	5⅞	3.460	1 1/16	3 11/32	2.375	1 1/16	1/16	2.562	1/8	1 7/16	1½	5/16	63 mm.
2 lb. preserves	24¼ oz.	10¼	5 11/16	3.531	1 1/32	3 3/32	2.375	1 1/16	1/16	2.562	1/8	1 5/32	1 17/32	5/16	63 mm.
2 lb. apple butter	27½ oz.	11¼	6¼	3.679	1	3 13/32	2.375	1 1/8	1/16	2.562	1/8	1 3/16	1 5/8	3/8	63 mm.
2 lb. peanut butter	30½ oz.	11¾	6 5/16	3.758	1 1/32	3 13/32	2.375	1 1/16	1/16	2.562	1/8	1¼	1 5/8	3/8	63 mm.
1 qt. liquid	32⅝ oz.	12	6¾	3.828	1 1/16	3 15/32	2.375	1¼	1/16	2.562	1/8	1 11/32	1¾	3/8	63 mm.
1 qt. hot-pack vinegar	33⅜ oz.	12¼	6 13/16	3.859	1 3/32	3 15/32	2.375	1 3/32	1/16	2.562	¼	1 3/8	1 13/16	3/16	63 mm.

Notes—1. Any standard GCA glass finish suitable to the jar body may be used.
2. For finishes other than specified GCA No. 400 shallow continuous thread use comparable sizes to GCA No. 400 as follows: GCA 400, GCA 140, GCA 800 and GCA 3900; 58, 64. GCA 1700; 55, 60. GCA 1400; 55, 60.

A 12-oz. tumbler would also be used for packing 1 lb. of preserves, jams, and marmalades.

The same jars would be used for packing jellies. The weight of the contained jelly in the various sizes of jars would be about the same as the weight of preserves, jams and marmalades. Two sizes of tumblers are proposed in addition to the glass jars. These tumblers would have an 8 and 12 fluid ounce overflow capacity, and hold 10 oz. and 1 lb. of jelly, respectively. In view of the Army's requiring large quantities of tumblers as replacements at their cantonments, it has been suggested that these tumblers be filled with foods such as preserves and jellies, and not be shipped empty.

For fruit butters, the same size jar would be used, but the contents would be slightly less than for preserves and jellies. As an example, the 12¼ fluid ounce jar would hold 14 oz. and the 24¼ fluid ounce jar would hold 1 lb. 12 oz. No tumblers are proposed for fruit butters.

The Pickle Packers Association is considering the 8⅜, 12¼, 16⅜, 22¾ and 32⅝-oz. (fluid) overflow capacity jars as fulfilling their requirements. These sizes would pack ½ pt., 12 oz., 1 pt., 22 oz., and 1 qt., respectively.

Other Containers

The possibility of using a wide-mouth pottery container to augment any inadequate supply of glass containers has been presented. There is at the present time enough paraffine to seal such a container. Also introduced as a possible substitute is a glass-closure type of jar using reclaimed rubber for the special type sealing gasket.

Beer's going out of tin cans throws another burden on the glass industry. Forty thousand bottles are said to be equivalent to one million cans, because each bottle has the approximate life of 25 trips. All beer bottles must be returnable, which throws the nonreturnable beer bottle out for the duration.

Closures

Glass-container closures are equally scarce, if not more so, than the actual containers themselves. No decision as yet has been made as to who gets these closures, but it is expected that no one will get anything scarce for nonessential food packaging. This condition is brought about by the shortage of rubber and cork used for closure gaskets, and liners. Orders regulating glass containers were forecast in early March. It was decided that those who could safely package in glass without a rubber gasket would be required to do this, regardless of the importance of the goods involved. Thus, packers of salad dressings, peanut butter and quite a number of other commodities will probably have to eliminate completely any type of closure which uses rubber. The packaging of some less important commodities which cannot be well sealed without a rubber gasket may still get rubber for quite a time. But ultimately they will do without also, even if that should prevent successful packaging.

Metal Saving

The second stage in container restrictions originally planned has as its purpose metal saving. That restriction is but little less urgent than rubber economy. Several factors determine who gets the metal closure and what type he may use. Fewer large containers save closure material for a given quantity of foodstuffs. Those who will package in large containers are thus given some preference. Those who can use thin metal closures also have an advantage. A crown-type closure is preferred to a screw type as it uses less metal per bottle. Certainly, double metal closures are going to be eliminated.

It is not beyond the realm of possibility that glass-making materials will become so scarce as to establish the need for reuse of glass containers to a certain extent. If many different foods are packaged in identical types and sizes of containers, this reuse will be far more practical than otherwise. It is to be hoped that the great benefits of simplification and standardization will overshadow the troubles and inconveniences.

Wrappers Tested For Moisture Loss

By GORDON W. McBRIDE
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Cellophane or foil alone found satisfactory when sealed. Simple method can be used to measure moistureproofness of "economy" wrappers

USE of cellophane and metal foils has been greatly restricted in a number of packages by the need to conserve materials vital to war production. Cigarettes, chewing gum, and candy packages are among the most important items affected.

As a part of the paper-research project at the National Bureau of Standards, the efficacy of waterproofed cellophane and of metal foil used in cigarette packages as moisture barriers was studied by using packages wrapped in various ways in a large tobacco factory. Although these tests were made with cigarettes, the results are just as significant as if a food had been inside the packages.

An accelerated test was made with a number of variations in the wrapping materials. The standard package, with unsealed metal foil covered by sealed cellophane, served as basis for comparison. Packages with unsealed foil only, with sealed foil only, with sealed cellophane only, and with no wrapper were also tested.

As would be expected, the unsealed packages lost moisture very rapidly. All the sealed packages showed about the same moisture loss shown in Table I.

Commenting on the losses reported for the sealed packages, the Bureau of Standards says that "the differences between these values are not significant, as packages vary in the tightness of the seals of the wrappers."

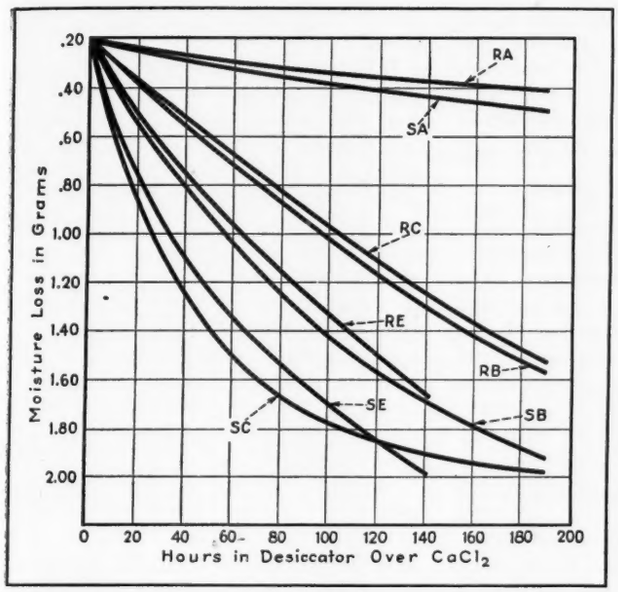
These tests show that from the standpoint of moisture loss one or the other of these wrappers alone would be sufficient. Such a conclusion however neglects appearance, strength, and other important factors which must be considered in packaging any commodity for distribution.

With the present outlook for the supply of cellophane and metal foils, food

TABLE I—Moisture loss.

Wrapper	Moisture loss in test
Standard package (unsealed foil, sealed cellophane)	5%*
Package with unsealed foil only	38%
Package with sealed cellophane only	8%*
Package with sealed foil only	5%
Package with no foil or cellophane	67%

* Average of two reported tests.



Moisture loss from packages of cigarettes wrapped in various ways. Tests varied from 140 to 190 hours. Loss of 2 grams represents approximately 80 percent of moisture in product. (R—standard package. S—special package, foil omitted. A—package tested as received. B—top of cellophane wrapper removed. C—all of cellophane wrapper removed. E—one-fourth of top of package cut away, exposing part of cigarettes; cellophane sleeve left on.)

and cigarette manufacturers will probably have to get along without both wrappers. In an effort to determine the relative value of substitute wrapping materials for food packages, the following simple Bureau of Standards test method may be helpful. Samples for the accelerated test are placed in desiccators for 120 hours, and thus exposed at room temperature to an atmosphere dried with calcium chloride. The samples are weighed at appropriate intervals to determine the loss of moisture.

The moisture loss from packages under normal shelf conditions was not reported, but comparable relative behavior could be expected, it is believed. Perhaps the same moisture losses as in the tests would occur quickly on the shelf in the midsummer in arid southern Arizona, perhaps the same moisture loss in 120 days instead of 120 hours in more humid southern Louisiana. The fact remains that moisture-proof wrapping is essential to the maintenance of quality in many food products.

War Brings Problems In Use of Adhesives

By L. EICKSTEDT
Arabol Manufacturing Co., New York, N. Y.

Adhesives may cause trouble, unless precautions are taken, when packaging materials are changed to meet wartime conditions. Pointers on how to avoid trouble are given here

ADHESIVES complete 90 percent of the packaging done today. And it is fortunate that the raw materials at the disposal of adhesive manufacturers are many. While it is true that starches from certain regions will be cut off, other regions will help to meet the demands, provided we can get ship bottoms and keep the sea lanes open.

As insurance against wartime shortages, alternate adhesives have been developed which are acceptable to industry. But it is no more than fair to say that while adhesives manufacturers will try to accomplish wartime change-overs with the least convenience to industry, it must be realized that alternates may not be as readily soluble, if a dextrine, or they may not take as much water. They may not be as quick drying or tacking. It may be necessary to lay out work a little longer. The color may be different. On the other hand, as alternates go into production, much of what sounds like pessimism can change to optimism.

Adhesives are not unlike many things used by industry in that today's article can be an improvement over yesterday's by virtue of practical experience. The ingenuity of a research staff can do much to overcome the lack of some raw materials. We therefore hope and expect that industry's production will not be curtailed for want of adhesive materials.

Cornstarch in the hands of capable research men is taking on many of the properties of tapioca. Resin emulsions with other ingredients added can function in some places for latex. Reclaimed-rubber-water dispersions are also coming into their own despite first objections to their dark color. Extenders are being added to many of the scarcer or critical materials so they will go twice as far with very little apparent change in their physical properties or ability to function for their original purpose. Animal glue is having many demands made upon it so that the use is greater than the supply. Alternate adhesives are available which function equally as well and prompt deliveries can be effected.

Machines and Adhesives

Machines for the automatic packaging of every product are constantly being improved. Sometimes the same adhesive used on a present or previous machine installation functions on the new machine. However, if it does not, do not hesitate to call in your adhesive supplier for his latest recommendation. Then too, many adhesives are continually being modernized because of new materials offered adhesive manufacturers by numerous chemical companies. In the past decade the adhesive industry has been offered resins with various softening points, solvents, cellulose derivatives, starches, plasticizers, synthetic waxes, wetting agents, emulsions and water dispersions of reclaimed rubber, which heretofore were either not known or so expensive that they were merely laboratory curiosities. These materials when compounded with other available ingredients will be used to the utmost to keep industry supplied with adhesives.

Inasmuch as 90 percent of packaging production is performed on some make of machine, it is important to be machine conscious. The proper adjustment of an automatic machine can contribute excellent working conditions to an adhesive. On the other hand, poor adjustment can ruin a test of a perfectly suitable adhesive. These adjustments are best understood by op-

erators who have been instructed by erectors of the machine or from books of instruction. At all times the operators should comply with such teaching. Nevertheless, we all get careless and either forget that oil should have been applied to a certain part or we put it off until some other time. Wear or crystallization may be affecting a certain part, and that part should be replaced instead of trying to plug along on "one cylinder." Sometimes a jam takes place because a machine is speeded beyond its capacity or forced to take a package out of size. This causes springing of certain parts and affects the timing or various adjustments.

Under present conditions it would be well to go over machines very carefully and restudy books of instructions. This is true for two reasons: First, new help may be only partially instructed. It is very easy to belittle some of the things that become habits with one who is very versed on a particular job and fail to point out some of the pitfalls that were overcome by previous experience. Secondly, when one has worked on a machine for some little while, the contents of a book of instructions are better understood and the knowledge it imparts is better applied.

Cleanliness is an important factor, especially with the adhesive reservoir on the machine. In some industries a thorough cleaning of the adhesive reservoir twice a day is not doing too much as a contribution to good sealing results. It is surprising to see how much foreign material collects in a glue box in a few hours. In regard to machines using heat on the gum box, foreign materials will char and the drying out of adhesive will retard heat transfer.

Paper and Adhesives

The paper used in packaging should always be considered in relation to adhesives and packaging machines. The weight of the paper, the porosity and the direction of the grain are all important factors in paper buying. If you have specifications for paper purchases it would not be advisable to allow any change to be made without first consulting the manufacturer of the machine in operation and the manufacturer of the adhesive that is in use. The same recommendation applies when paperboard is used. If there are no specifications for the paper or paperboard now being used, it would be a very good plan to have a set of specifications drawn up, based on the satisfactory results of the material used in the past.

When a plan is being developed for any new packaging, do not hesitate in placing your contemplated problem before both the adhesive and machine manufacturer. Many hours of production and adjusting can be saved. Perhaps a saving of money may result by preventing the scrapping of a lot of material which may prove to be unadaptable to your production set-up. All the material that you will be able to save now will probably come in handy in the future.

It is always good business sense to watch the spigot as well as the bung. And speaking of spigots, it is a good idea to use them on drums for any adhesive that will flow. This prevents waste. Most spigots in use are cast iron and the sliding faces tend to become clogged with dried adhesive. If a drop of oil is put on these surfaces from time to time, it will prevent the adhesive from crusting and make the spigot easier to open. It is a common occurrence to see broken spigots as a result of trying to open them with a hammer. Cast iron and hammers are not good company.

Adhesives should be kept at a temperature of about 60 deg. F. in so far as possible. However, if this is not possible, be sure to take the temperature into consideration before criticizing the adhesive's working properties. Certainly do not store it where it will freeze. Temperature affects the viscosity. There are types of adhesives that are very heavy at 40 to 50 deg. F. and would appear to need a large amount of added water to make them usable, whereas if they were kept at a temperature of 60 deg. F., or slightly more, they would appear to require less water to be usable. Adhesives should not be stored in a very warm place because moisture is driven off and eventually the adhesive dries out. This is especially applicable if the adhesive has any solvents in it. In many plants during the winter, the cartons, machines and adhesives can all be kept at the same temperature. This creates the best condition. If machines are working at room temperature and cartons are brought in from a warehouse at another temperature and adhesive at still another temperature, one should pause for a moment to realize that a factor known as "shock" will throw production out of alignment until all conditions are balanced.

Wherever it is not practical to keep the entire storage of supplies at the temperature of usage, it should not prove too much of a hardship to accumulate enough items for a few hours' operation at a working temperature. This permits them to become tempered and shock is not encountered. Finally, if this is impossible, the adhesive manufacturer should be made cognizant of this fact so that an adhesive can be formulated accordingly, or one recommended which offers such latitude.

Rarely is it necessary to apply a heavy coat of adhesive. A thin application of a good adhesive with high solid content dries quicker and gives a stronger bond because it really pene-

This battery of equipment represents a distillation method for determining the amount of moisture in adhesives

Vacuum still for carrying out research on starch-water solutions used in adhesives.

trates into the fibers and makes a strong lamination, not a bridge as happens when a heavy coat of adhesive is applied.

Containers for Adhesives

Today all adhesive companies shipping their products in steel drums must insist that the drums be returned, even to the extent of placing a charge against them. This is not done to annoy you. It is just as much a nuisance in bookkeeping to them as it is to you. They are having their difficulties in getting steel drums and want them back so they can give uninterrupted delivery of adhesives. In order to make a steel drum their property, it is good business economics to put a "value to them" on it.

It may also become necessary to ship less than 5-gal. quantities in glass instead of tin. Where companies have been buying several gallons of adhesives in separate cans, it is becoming necessary to purchase the same thing in single 5-gal. containers whenever possible. The contents of the 5-gal. container can be removed by the receiver and packed into smaller containers from a previous shipment which have been thoroughly cleaned and dried before refilling. All of these requests have only one purpose in mind—a contribution to the war effort. Government rulings in most every case are the basis of such action.

As steel drums become exceedingly difficult to obtain, it is necessary to ship in wooden barrels. In opening a barrel, try to keep the head intact, and nail a cleat across it to permit its use as a cover. And put a heavy damp cloth across the head before putting the cover on. This overcomes evaporation of moisture from the adhesive. Wash out this cloth every day or two, especially if your plant is dusty. If prohibitive measures are not taken, particles of dust coming in contact with moisture tend to become sour smelling and moldy. In the case of adhesives, not only is odor imparted to it, but the bacterial action damages the working properties of the adhesive.

Foods That May Be Packed in Tin

Quantities and Can sizes

These data are from Tin Conservation Order M-81. Foods not on this list cannot be packed in tin.

Table I—Primary Products

Items appearing in this list may be packed without any restrictions on the amount of tin or number of containers required, except within the restrictions appearing with each product.

Item	Size of Can
FRUITS	
1. Fruit Cocktail and Fruits for Salads. Includes any combination of fruit otherwise included on this table and Table II, but including at least 50 percent fruits listed in Table I. If fruits are taken from other tin cans to make up Fruit Cocktail and Fruits for Salad, the fruits must be pineapple and maraschino cherries and they must be taken from No. 10 or larger cans and must make up not more than 10 percent of the total weight.	No. 1 tall; No. 2; No. 2½; No. 10
2. Peaches, Clingstone and Pears (halves, segments and slices). Whole peaches and pears not to be packed.	No. 2; No. 2½; No. 10
3. Pectin (dry and liquid)	5-gal. can or larger
4. Grapefruit, Lemon, Lime, Orange Concentrates, including but not limited to dry, powdered, dehydrated juices from the same fruits, with or without drying promoters.	No. 1 Picnic or larger cans
5. Peaches, Freestone	
(a) Packed in other states except California	No. 2; No. 2½; No. 10
(b) Peaches packed in California	See Table II
VEGETABLES	
1. Asparagus	No. 2; No. 2½; No. 10; No. 1 Square; No. 2½ Square
2. Beans—Packed fresh, including, but not limited to green,* wax,* fresh shelled, lima and green soybeans. Dried beans and peas not to be packed.	No. 2; No. 2½; No. 10
3. Corn.* Does not include corn on cob	
(a) Cut sweet corn	No. 2; No. 10
(b) Dry pack only	No. 2 Vacuum
4. Peas*—Fresh, green	No. 2; No. 10
5. Tomatoes*	No. 2; No. 2½; No. 10
6. Tomato Paste, Sauce, Catsup, Chili Sauce	No. 10 cans or larger See Table II.
7. Tomato Pulp or Puree. The foregoing tomato products packed in 5-gal. or larger cans may be repacked in other tinplate cans either unchanged or in combination with other products.	No. 1 Picnic; No. 2; No. 2½; No. 10; 5-gal.
8. Baby Foods—Vegetable Purees, and Chopped Foods (for human consumption and only if packed for those purposes in 1941).	No. 202 B.F. (202x214); No. 211 B.F. (211x210); No. 2; No. 10
JUICES	
1. Tomato Juice. (May contain up to 30 percent other vegetable juices.) A Canner who lacks adequate machinery, equipment or plant facilities for packing his entire 1942 crop, in respect to tomato juice, in No. 2, No. 3 Cyl., No. 10 cans may, upon application to WPB, pack the excess 1942 pack in No. 211 Cyl. or No. 300 cans, if equipped to do this and did so in 1941.	No. 2; No. 2 Cyl; No. 3 Cyl.; No. 10
FISH AND SHELLFISH	
1. Salmon	
2. Sardines	
3. Tuna and Tuna-like fish	
4. Mackerel	
5. Alewives, including Alewife Roe	
6. Fish Flakes. Dried fish flakes not to be packed.	
7. Crab	
MISCELLANEOUS FOODS	
1. Cold Pack Foods, including, but not limited to blueberries, strawberries, apples, cherries, peaches, asparagus, lima beans, peas.	30-lb. or larger cans
2. Baby Formulas	
3. Evaporated Milk	14½-oz. cans or larger See Table II
4. Dry Milk including only dry or powdered whole milk.	1-lb.; 2½-lb.; 5-lb.; 10-lb.; 25-lb.
5. Special Dietary Products, including but not limited to, baby foods	
6. Honey	"5-lb." can or larger
7. Dehydrated Vegetables	No. 10 or larger cans

*A canner who lacks adequate machinery, equipment or plant facilities for packing the entire 1942 pack of such products in No. 2, No. 2½ or No. 10 cans may, upon application to WPB, pack the excess of the 1942 pack of such products in No. 303 cans, if the canner is currently equipped to pack in No. 303 cans and did so in 1941.

See NOTE at end of Table II.

Table II—Secondary Products

All quantity limitations relating to size of pack refer to the entire year commencing January 1, 1942, except in the case of citrus fruits, for which see the seasonal basis provided in Item 8 of "Fruits" and Items 3, 4 and 5 of "Juices." Such quantity limitations refer to the amount of tinplate used in packing rather than to the amount of product packed. The quantity limits relate only to the pack permitted for civilian consumption. To the extent of additional requirements by the Army, Navy, Lease-Lend or other U. S. Government Agency, such pack may be increased. (See news story on page 69.)

Item	Size of can	Quantity Limitations
FRUITS		
1. Apples and Crabapples, not including whole apples and apple butter.	No. 10 cans or larger	75 percent of 1940 pack
2. Apple Sauce, including sauce from crabapples.	No. 2; No. 10	100 percent of 1940 pack
3. Apricots. Whole apricots not to be packed.	No. 2½; No. 10	75 percent of 1940 pack
4. Berries (only when packed as berries), including but not limited to blackberries, blueberries, huckleberries, loganberries, raspberries and strawberries.	No. 2; No. 2½; No. 10	100 percent of 1940 pack
5. Cherries (only when packed as cherries), including, but not limited to Red-Sour-Pitted and Sweet Cherries.	No. 1 Tall; No. 2; No. 2½; No. 10	100 percent of 1940 pack
6. Coconuts, shredded with milk only.	No. 10	100 percent of 1940 pack
7. Cranberries, including cranberry sauce.	No. 300; No. 2; No. 10	100 percent of 1940 pack
8. Grapefruit and combination of Orange and Grapefruit, including only segments, sections and slices.	No. 2; No. 2½; No. 5	100 percent of 1941 pack
9. Olives (ripe)	No. 1 Tall; No. 2; No. 2½; No. 10	50 percent of 1941 pack
10. Peaches, Freestone	No. 2; No. 2½; No. 10	75 percent of 1940 pack in California
11. Pineapple, including only sliced, crushed, tidbits. Spears not to be packed.	No. 2; No. 2½; No. 3 Cyl.; No. 10	100 percent of 1940 pack
12. Plums and Fresh Prunes	No. 2½; No. 10	50 percent of 1940 pack
VEGETABLES		
1. Beets*	No. 2; No. 2½; No. 10	75 percent of 1940 pack
2. Carrots. Whole carrots not to be packed.*	No. 2; No. 2½;	75 percent of 1940 pack
3. Carrots and Peas	No. 2; No. 2½; No. 10	75 percent of 1940 pack
4. Pimentos and Peppers	No. 2; No. 2½; No. 10	50 percent of 1940 pack
5. Pumpkin and Squash	No. 2½; No. 10	50 percent of 1940 pack
6. Rhubarb	No. 10	50 percent of 1940 pack
7. Sauerkraut	No. 2; No. 2½; No. 10	50 percent of present bulk kraut holding capacity
8. Spinach,* and other Green Leafy Vegetables.	No. 2; No. 2½; No. 10	100 percent of 1940 pack
9. Okra*	No. 2; No. 2½; No. 10	100 percent of 1940 pack
10. Tomato Products (a) Tomato paste (b) Tomato Sauce (c) The paste and sauce may be packed in whole or in part from contents of other tinplate cans of 5-gal. or larger sizes.	 (a) 6Z (b) 8Z Short cans	100 percent of 1940 pack
11. Vegetables, Mixed, including 90 percent of any combination of vegetable included on Table I and Table II, but no potatoes to be included.	No. 2; No. 2½; No. 10	75 percent of 1940 pack
12. Succotash, only when made from fresh or frozen vegetables.	No. 2; No. 10	100 percent of 1941 pack
JUICES		
1. Lemon Juice and Lime Juice	8Z Tall; No. 2; No. 10	50 percent of 1940 pack
2. Pineapple Juice	No. 2; No. 3 Cyl.; No. 10	100 percent of 1940 pack
3. Grapefruit Juice	No. 2; No. 3 Cyl.; No. 10	125 percent of 1940–1941 pack
4. Orange Juice	No. 2; No. 3 Cyl.; No. 10	125 percent of 1940–1941 pack
5. Combination of Grapefruit and Orange Juice	No. 2; No. 3 Cyl.; No. 10	125 percent of 1940–1941 pack
6. Fruit Nectors	No. 2; 211 Cyl.; No. 3 Cyl.; No. 10	100 percent of 1940 pack
MISCELLANEOUS FOODS		
1. Canned Condensed Soup. Soups packed in condensed from so that when prepared for serving at the table, at least a can of water or other liquid is added to a can of soup to make a soup representative of its class. Soup is to be made from only products included in Table I and Table II.	No. 1 Picnic	100 percent of 1941 pack
2. Canned Soups, Broths, Chowders, other than condensed soups.		25 percent of 1940 pack. Not to be packed after June 30, 1942
3. Condensed Milk, Goat's Milk	14-oz.; 15-oz.	100 percent of 1940 pack
4. Malted Milks, Modifications of Milk, except Filled Milks.	1-lb.; 5-lb.; 10-lb.; 25-lb.	100 percent of 1940 pack
5. Eggs, frozen	10-lb. and larger cans	100 percent of 1940 pack
6. Liquid Oils, Vegetable, Marine, Annual, or edible blends of such oils.	1-qt. or larger cans	100 percent of 1940 pack
7. Hardened Edible Oils, Unhardened or Hardened Lard, Rendered Porkfat, Edible Tallow. Includes animal, vegetable and marine blends of the above products.	3-lb. or larger cans	100 percent of 1940 pack up to and including June 30, 1942. 60 percent of 1940 pack after June 30, 1942
8. Sweet Sirups, including cane, maple, molasses, corn and sorghum sirup	5-gal. or larger cans	100 percent of 1940 pack
9. Evaporated Milk	6-oz.; See Table I	100 percent of 1940 pack
10. Frozen and Storage Cream	Only in reuse cans and only in nested style 45–50-lb. cans	100 percent of 1940 pack
MEATS		
1. Beef, Veal, Mutton (Corned, roast, or boiled; only for human consumption.)		100 percent of 1940 pack
2. Brains	10½-oz. or larger cans	75 percent of 1940 pack
3. Chili Con Carne (a) Not to be packed with beans	 1-lb. cans	100 percent of 1940 pack
4. Meat Loaf. Must contain at least 90 percent meat and no water added		75 percent of 1940 pack
5. Meat Spreads		50 percent of 1940 pack
6. Sausages in Casings (a) Vienna sausage (b) Sausage in oil, or lard or rendered pork pack. (c) Other sausages in casings	 (a) 4-oz. or larger cans (b) No. 5 or larger cans (c) 12-oz. or larger cans	 75 percent of 1940 pack 75 percent of 1940 pack 25 percent of 1940 pack
7. Bulk sausage meats	12-oz. or larger cans	125 percent of 1940 pack
8. Tongue (whole only)		75 percent of 1940 pack
9. Boned Chicken or Turkey	1-lb. or larger cans	100 percent of 1940 pack
10. Chopped Luncheon Meats	12-oz. or larger cans	125 percent of 1940 pack
11. Meat (potted)	3-oz.; 5-oz. or larger cans	125 percent of 1940 pack; 50 percent of 1940 pack, if cans smaller than 3-oz.
FISH AND SHELLFISH		
1. Shad		100 percent of 1940 pack
2. Clams, Muscles (whole and minced)		100 percent of 1940 pack
3. Oysters		100 percent of 1940 pack
4. Shrimp		100 percent of 1940 pack
FISH AND SHELLFISH (For refrigeration shipments, fresh)		
1. Oysters, Shrimps, Clams, Scallops, Crabs; only when shucked	1-lb.; 1-gal. or larger cans	100 percent of 1940 pack
2. Fish Fillets	20-lb. or larger cans	100 percent of 1941 pack

*Quantity limitations on the packing of these vegetables are effective on May 31, 1942, provided they were planted on or before February 11, 1942, and on this date the canner had already contracted for their purchase for canning or was growing these vegetables with the intention of packing them in cans.

NOTE; A Canner who lacks equipment, machinery, or plant facilities for efficient packing of any of the products, listed under "Fruits," "Vegetables" and "Juices" in Table I and Table II in any can size or sizes specifically designated may pack these various products in a larger can (not a No. 12 can) if (a) the canner is currently equipped to pack the product in a larger can and did so in 1941, and (b), the larger can is recommended for the particular product by the National Bureau of Standards Recommendation R155–40; and he may pack the product in a No. 12 can in any event.

QUALITY CONTROL

Cans Washed Cleaner, at Lower Cost, With Acid Detergent • System Is Key to Controlled Quality

Acid Detergent Makes Cans More Sanitary*

By F. M. SCALES
Sheffield Farms, Co., Inc., New York, N. Y.

Use of an acid detergent in place of an alkaline detergent for the washing of milk cans not only gives cans with lower bacterial counts, according to tests made by Dr. Scales, but also shows economy in the use of both detergent and steam

THE original work in washing cans with an acid detergent as carried out in 1939 and 1940 yielded very satisfactory results. The report of this investigation was presented at the meeting of the International Association of Milk Dealers in 1940[1]. A company that was alert to the possibilities of the new procedure has, since then, marketed the solution described and a machinery manufacturer (Lathrop Paulson) has developed a special can washer for the use of acid detergents.

About a month after starting to wash cans with an acid detergent in place of an alkaline one at one of Sheffield Farms Co.'s receiving stations, it seemed a good idea to obtain the reaction of the men who were critically inspecting the cans as well as using the acid detergent daily in the can washer. The district superintendent was asked what he thought of the acid method for cleaning cans. He said, "It gives us the cleanest cans I have seen. I picked out some cans and kept them covered and find that they remained odorless."

The plant manager answered the same question with, "I like it. It gives us clean, dry cans." I also asked him if he thought the acid procedure was removing any deposit from the can washing machine. He replied, "Yes, it is. Only yesterday, when we were hosing it down, we heard a noise of something dropping and on looking through the machine found it was a limestone deposit that had dropped off one of the pipes."

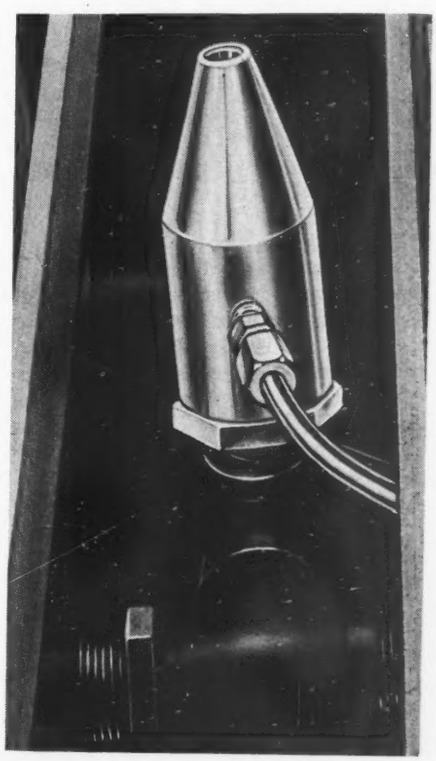
The driver who brought in the last load of producers' milk said that a couple of the farmers had remarked to him: "Well, the cans seem very much better. I no longer notice any odor in them."

Thus it seems that the men who are using the procedure and those who are handling and inspecting the cans have only favorable comments regarding them.

Since the data presented in this report is applicable for a more sanitary and economical operation in can washing it is well to emphasize that these results can only be obtained under certain conditions. In 1940, Parker[2] reported a procedure for cleaning cans which consisted in washing them with an alkaline solution according to custom and then injecting a charge of gluconic acid into the steam used for sterilizing at the end of the procedure. Although this acid is not a detergent and has but slight germicidal quality, it did react chemically with the alkaline film of sodium caseinate on the inside of the cans. By removing this bacterial-laden film, it reduced the number of bacteria in the cans and so was a sanitary improvement over the ordinary alkaline washed cans. Some operators** seem to think they can obtain the benefits of this new procedure with any acid cleaner by substituting it for alkali in the ordinary can-washer. This is not so. Before using this acid detergent to obtain both the improved sanitary condition and economy of operation, the washer should be modified as described in this report.

How Tests Were Made

In the investigation to determine the comparative value of the alkaline and acid detergent solutions for cleaning milk cans, the runs were made with the Lathrop Paulson "Standard Automatic" can washer (12 cans per minute) for the test with the alkaline solutions. Then, for the acid treatment, this washer was changed to function the same as the new Lathrop-Paulson "Conservation" type washer. The latter machine has special spray nozzles and a special hot water rinse adjustment which increase the value of the acid treatment as well as permit more econom-



Spray nozzle developed by Lathrop Paulson for the can washer designed to use the acid detergent.

* Received for publication January 26, 1942. Results originally reported to Sheffield Farms Co., October 21, 1941. Read before Massachusetts Milk Inspectors' Association at Worcester on January 8, 1942.

** Complaints have been heard from two operators that they did not obtain satisfactory results. On investigation it was found that they had bought acid solvents which have been on the market for removing deposits. These products are not satisfactory as acid detergents for can washing.

mical operation.

The water in the plant where this investigation was made contains 230 parts per million or 13.5 grains of hardness. For washing cans with alkaline solution, a special powder, containing a liberal quantity of a polyphosphate along with trisodium phosphate, metasilicate and wetting agent was employed. Experience had proved the powder an excellent one for this purpose. Hence a rather high standard was set for comparison of the results obtained with the acid treatment.

The acid solution was prepared with Bonewitz Chemical Co.'s "Mikro San," which is an acid detergent especially prepared for this purpose and based on the formula which was first presented in my reports to the International Association of Milk Dealers at the Atlantic City meeting in 1940.[1]

The solution used for the alkaline washing was maintained at 0.07 percent alkalinity to phenolphthalein to allow a slight excess over the 0.05 percent requirement of the New York City Board of Health.

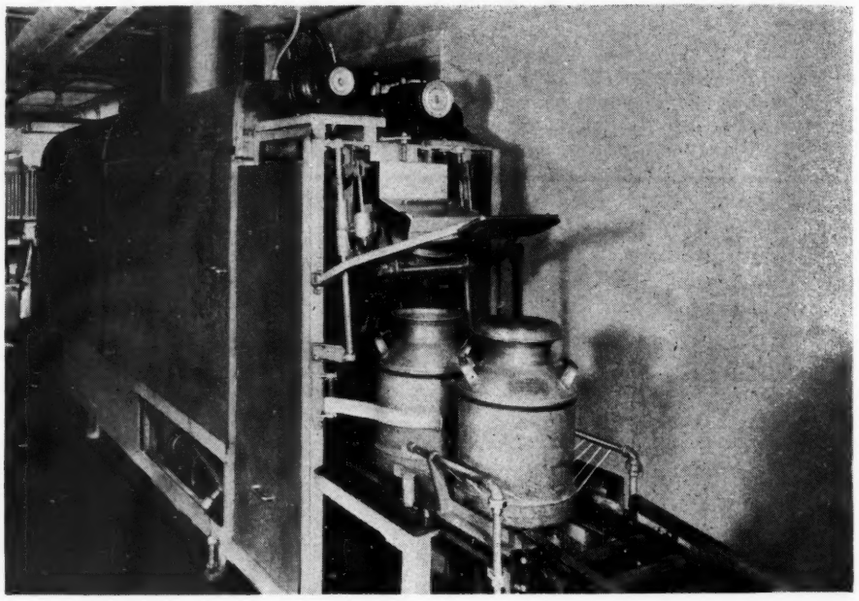
During the morning's washing operation every 16th or 17th can was taken from the conveyor at the end of the washer. This gave a total for plating each day of approximately 17 samples.

After a run of 17 days with the alkali treatment, during which 5,888 cans were washed, the washer was changed for the acid treatment. Again the same procedure was followed for 17 days to determine the bacterial content of the cans after washing. Due to an increase in the number of cans received during this period the total washed was 6,492.

The total plated from each washing procedure was 277 cans.

The procedure for obtaining the bacterial count of the washed cans consisted of pouring 460 ml. of sterilized tap water into the can after it had been removed from the can washer, placing the cover on the can, and then rinsing the inside by vigorously shaking the can, while holding the handle and the bottom, five times back and forth; then rolling the can over and again shaking it in the same way on the opposite side. After this, the rinse water was carefully poured back into the sterile bottle, covered with the sterile foil cap and placed in ice water until it was plated.

In order to obtain the total count in this rinse water, duplicate plates were prepared with 1 ml. and with a dilution of 1/100. Then 10 ml. of tryptone glucose extract agar was added according to the usual procedure. These and all other plates were incubated at 37 deg. C. for 48 hours before counting them.



Can washer developed by Lathrop Paulson for cleaning cans with an acid detergent.

The proteolytic count was obtained by plating on tryptone glucose extract agar with an addition of 1½ percent "Difco" skim milk powder. The plates were prepared in duplicate with the same dilution strengths employed for the total count. Those colonies showing a clear zone around them at the end of the incubation period were counted as proteolytic ones.

The remainder of the rinse water was heated to 143 deg. F. and held at this temperature for 35 minutes after which it was cooled as rapidly as possible and then plated in duplicate as previously described on tryptone glucose extract agar. All colonies developing after this treatment were counted as thermoduric organisms.

Results of Tests

The results obtained from these plates were grouped according to their counts and the percentage in each group figured. The results obtained were as shown in Table I.

It is noticeable that the acid treatment showed no cans with a bacterial content too numerous to count; that the percent in the group over 100,000 was four times as great with the alkali treatment as with the acid treatment; and between 38,000 and 100,001 the percent was approximately twice as great with the alkali treatment. If the percentages thus found are divided at the count of 38,000, which represents approximately a bacterial contamination in the cans of one organism per milliliter of contents, and the percentages above this mark added together and the same done with those below, we find that the percentage survival above this mark after the alkali treatment was 39.71 percent and only 12.99 percent after the acid, the latter being approximately one-third of the percentage found in the alkali. The low counts are the ones which are of special interest—those below 38,000. Here the sums of the percentages are 60.28 percent for the alkali and 87.01 percent for the acid. In the case of the counts running from 0 to 500 the alkali yielded 5.05 percent, whereas the total for the acid treatment was 26 percent, or five times as many sterile or nearly sterile cans.

This acid method gives promise, with further improvements, of the production of absolutely sterile cans[8] instead of the relatively sterile ones which are considered satisfactory now—relatively sterile meaning anything from 38,000 to 100,000 organisms per can.

The counts from the plates for proteolytic and thermoduric organisms were also placed in groups and the percentage in each group was as shown in Tables II and III.

The large reduction in counts of both proteolytic and thermoduric organisms obtained with the acid detergent is so closely parallel to the results obtained in the test for the total bacterial contents per can that the low counts must be due to a general germicidal action rather than to a specific action against the proteolytic and thermoduric bacteria.

Advantages of Method

One of the great advantages of the acid treatment is that the wetting agent in it promotes drainage so that when the cans get a blast of hot air the mois-

ture drains off freely, leaving a perfectly dry surface.

As already noted, the acid cleaned cans are odorless, whereas those washed with alkali are rarely so.

Since a few milliliters of the very dilute acid solution are sprayed into the can on top of the sterile rinse water to promote sterility and increase drainage for the hot air treatment that immediately follows, there is naturally a question as to whether this acid might not affect the acidity of the milk or even curdle some of it. To obtain data to answer this question, freshly washed cans were rinsed with 50 ml. of fresh, raw milk and then 10 ml. used for the titration with penolphthalein as the indicator.

These results, shown in Table IV, indicate that there is not enough acid remaining in a forty quart can to affect the reaction either in pH or in titration of as little as 50 ml. of milk. The acidity of the raw milk control, when shaken in a bottle to simulate the agitation in rinsing the cans, was reduced slightly more than in the cans. The difference is so small that it is of no importance. It may be due to more thorough shaking by which the dissolved carbon dioxide was expelled.

The advantages of using an acid detergent for cleaning cans are that it will produce a cleaner, more nearly sterile can than any other treatment and an odorless can which should better preserve the normal flavor of the milk. Further, when this detergent is used in a can washer with the mechanical improvements especially made to take advantage of its action, all of these results may be obtained at a considerable economy over any of the alkaline washing treatments.

Economies Obtained

One very important factor for economy in any can washing operation is the steam consumption per can. For the acid detergent the economy is obtained by changing the machine so that it functions like the "Conservation" type washer. The modification also makes possible a saving in the quantity of acid detergent.

In order to obtain some idea of the steam consumption per can, flow-meter readings were taken for a period of five days[4] with the alkaline treatment and eleven days with the acid treatment. The total number of cans washed by the alkaline treatment during this period was 1,806 and the steam used was 6,866 lb. This equals a consumption of 3.80 lb. per can.

The total number of cans cleaned with the acid detergent during the eleven days was 4,249 and the steam consumed was 12,651 lb. This equals a consumption of 2.98 lb. per can.

This represents a saving of 0.82 lb. of steam per can or 820 lb. per 1,000 cans. The saving per 1,000 cans is thus equal to 27 boiler horsepower or 122 lb. of coal, which at this plant is a saving of $0.76. The saving would be still greater if the washer could be operated continuously but there are idle periods when no milk is in and this reduces the economy of the operation.

In these tests, the comparison was made on the same machine. If the economy of the acid method were compared with the alkaline washing on another machine, the saving would be still greater. For instance, this same flow meter on a can washer of another make showed a consumption of 4.58 lb. of steam per can. The acid detergent can washer would thus save approximately 1.6 lb. of steam per can or $1.48 in coal per 1,000 cans, twice as much as in the case just cited.

The record kept of the quantity of alkali and acid used for a day's operation showed that the average quantity of cleaning powder was 7.9 lb., which at 8.95 cents per pound cost 71 cents. The average quantity of acid used was 1.4 lb. at a cost of 41 cents. The acid detergent thus saves 30 cents on each day's operation, $0.91 on 1,000 cans.

The saving obtained by the use of the acid detergent would thus total for cleaner and coal approximately $1.67 per 1,000 cans.

Corrosion Is Reduced

The use of acid naturally raises a question about corrosion of the cans. Laboratory tests with tinned iron plates under conditions that promote corrosion, that is, a temperature of 150 deg. F. with air bubbled through the solution for one hour to every seven of the test, showed that the alkali was much more corrosive than the acid. This was so, although the alkaline solution was only 0.07 percent alkaline to phenolphthalein in accordance with Board of Health Regulations which require 0.05 percent alkalinity as a minimum, while the acid solution showed by titration 0.08 percent acid with the same indicator. Fresh solutions were used every seven hours. The losses in weight due to corrosion for 100 square centimeters after 100 hours' exposure were as shown in Table V.

The average corrosion produced by the alkaline solution is 11.7 times greater than that produced by the acid solution.

These laboratory results were supported by those obtained with four new cans, two of which were put through the washer at the plant during the alkaline run six times each day, making a total of approximately 100 runs through the washer. Two new cans were similarly treated during the acid run. The cans washed with alkali became spangled and oxidized while the

(*Turn to page 97*)

TABLE I—Total Bacterial Contents Per Can (in Percent) After Alkaline and Acid Washing.

High-count group	Alkali (percent)		Acid (percent)	
T. N. T. C.	4.33		0.00	
Over 100,001	21.30	=39.71%	5.05	=12.99%
100,000 to 38,001	14.08		7.94	
Low-count group				
38,000 to 5,001	36.46		22.38	
5,000 to 501	18.77	=60.28%	38.63	=87.01%
500 to 0	5.05		26.00	

TABLE II—Proteolytic Organisms Per Can

High-count group	Alkaline detergent (percent)		Acid detergent (percent)	
Over 100,001	13.5		0.0	
100,000 to 20,001	4.0	=38.4%	3.0	= 6.0%
20,000 to 5,001	18.9		3.0	
Low-count group				
5,000 to 1,001	21.6		10.4	
1,000 to 501	4.0	=63.4%	22.4	=94.0%
500 to 0	37.8		61.2	

TABLE III—Thermoduric Organisms Per Can

High-count group	Alkaline detergent (percent)		Acid detergent (percent)	
Over 100,001	15.3		0.0	
100,000 to 20,001	5.5	=38.8%	1.4	= 2.8%
20,000 to 5,001	18.0		1.4	
Low-count group				
5,000 to 1,001	31.9		13.0	
1,000 to 501	6.9	=61.0%	14.5	=97.1%
500 to 0	22.2		69.6	

TABLE IV—Results of Test To Show Quantity of Acid Remaining in Cans After Washing.

Cans No.	pH	Acidity (percent)
1	6.35	0.140
2	6.30	0.138
3	6.30	0.140
4	6.30	0.140
5	6.30	0.138
6	6.35	0.140
7	6.35	0.138
8	6.35	0.135
9	6.35	0.140
10	6.35	0.138
Raw milk control unshaken	6.05	0.140
Raw milk control shaken	6.40	0.130

TABLE V—Losses Due to Corrosion on Tinned Iron.

	Alkaline treatment (grams)		Acid treatment (grams)
No. 1	0.5397	No. 3	0.0354
No. 2	0.4630	No. 4	0.0499
Average loss	0.50135		0.04265

[4] There was a delay in shipping the flow meter so that it was only possible to obtain readings during the last five days of the alkaline run.

System Is the Key To Controlled Quality

By W. R. VAN METER
Kingston Cake Co., Kingston, Pa.

This article tells how to control quality in cake baking. But its principles apply just as well to other food processing. It's not magical formulas that make good foods good, but rather systematic control of many variables

AS in other food factories, the control of quality in the cake baking plant begins with the raw materials, ends with the finished product in the hands of the customer, and encompasses such apparently unrelated things as plant housekeeping, the training of personnel and the philosophy of the organization's top men.

Though the question of quality is a phase of production which has been more completely neglected by the bakers than by any other food industry group, the few companies who have instituted thorough scientific control programs have grown and profited far beyond their competitors.

For the cake baker, quality control must focus on just one point, and that is the taste, the savoriness, of his product when the customer eats it. There is no one word adequate to describe all the things it must be, though all of the attributes are functions of "taste."

Consider what a quality control program, to be effective, must maintain if this goal is to be reached: (1) Quality of raw materials. (2) Uniformity in production processes. (3) Quality of finished products. (4) Laboratory research.

No program of this sort can succeed unless a specific individual, or individuals, are charged with the responsibility and the authority to see that what has to be done is done. In organizations which enjoy the service of a laboratory, where the head of the laboratory is on an equal footing with other executives, he is the man who should be made responsible for the functioning of the program. But he must have the authority that goes with this responsibility, for otherwise the whole thing bogs down in a series of recommendations from the laboratory which lack the bite of compulsion when they reach either the production or purchasing departments.

Raw Materials Inspection

In the purchase, or use, of raw materials, it will be the job of the laboratory head to see that these materials conform to previously set standards of quality. For example, before buying eggs—whether frozen whites or yolks—a sample lot must first be sent into the plant. Ten cans or so will go to the laboratory, where they will be tested for total solids, for whipping quality, for color, flavor, odor, the amount of coagulated matter, and the presence of foreign material.

After the laboratory has taken its samples from these cans, they are sent to the weighing department. They are then dumped onto a table and inspected by the laboratory head, the production superintendent and the head of the weighing department. The contents of these cans are then scaled off for baking into cake. Cakes made with this special lot of eggs, together with samples of cake made with regular eggs to serve as controls, then go again to the laboratory for testing.

This time, the cakes will be tasted for flavor and eating quality. The color of the cake will be scrutinized. The volume of the cake, in cubic centimeters per thousand grams of cake, will be determined (see Fig. 1) and this figure checked against the control cakes and against the figure which has already been set as the standard for the particular type of cake in question.

The eggs from this sample lot must pass all tests. On the basis of their showing, the laboratory head will either okay them for purchase or reject them as unsuited for the company's use. Nor is this the end, for assuming that the decision on the eggs has been favorable, when the carload lot, of which the sample was the forerunner, arrives in the plant, the whole procedure is repeated to make certain that the quality of the samples has been maintained in the carload lot. Only when this is found to be so does the head of the laboratory approve the purchase.

The procedure described sounds far more complicated than it is in actuality. The routine of quality control can be acquired by an organization in a remarkably short time, given persistent effort by the man in charge of such a program, and full backing on the part of those at the top of the organization. The buying of flour, pie fruits, butter, shortening and the like should follow the same course as outlined above. This may be summarized as:

1. Inspection of a representative sample of the material.
2. Laboratory testing prior to use in the plant.
3. Carefully controlled baking or cooking tests made on production-size batches under production conditions.
4. Final laboratory inspection, testing and comparison with the standard.

Production Control

The control of production processes is an equally vital factor in so far as maintaining quality is concerned. Even the best materials can be made into mediocre cake if the proper controls are not set up for the production processes. It will first be necessary to determine what is the optimum point for such factors as baking time, cooking time, temperatures, pressures and, in the case of icings and batters, even densities. After such facts are determined, it becomes a matter of keeping the variables within the proper range.

In all cooking operations for instance, the batch should be cooked to a definite temperature, read from a thermometer. It should not be guessed at. This is such an elementary phase of quality control work that it hardly seems necessary to mention it. However, in the baking industry, the use of thermometers for checking temperatures is still far from being usual practice. More frequently than not, the formulas put out by the technical sales divisions of shortening, flour and sugar companies, intended for use by the baking industry, fail to specify definite cooking temperatures.

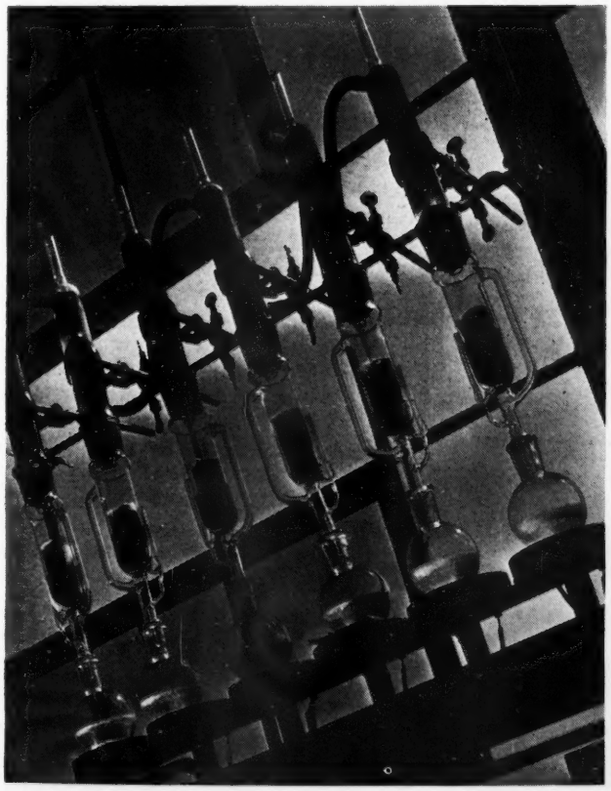
Batters should be mixed in rooms where some refrigeration makes it possible to maintain a temperature between 60 and 70 deg. F. Whatever batter temperature has been found to give best results from the standpoint of quality can then be made standard.

Not only is the temperature of the batter when it reaches the oven important, but so also is the batter density. The control of this variable is very necessary. Once the optimum density for a given kind of cake has been de-

termined, the batter can always be mixed to this density. A measurement of the density of the batter is easily obtained. A pan of known volume and known weight, say a pan holding a 1,000 c.c., is filled with batter, the top leveled off with a straightedge spatula, and then weighed. The standard weight of that volume of batter for that variety of cake has already been set. By comparison with the standard it is quickly ascertained whether the mixing has been carried sufficiently far along. Moreover, the keeping of a record of these batter densities in the mixing room will serve a dual purpose. First, it provides a means of checking back on the operations on the part of the production department, giving a clear picture of the batter as it left the mixing room. In the second place, it offers the mixing-room operator an objective measurement of the materials he works with, thus making it easier for him to do a better job. The experience of this writer is that there are very few men who are not interested in acquiring more skill at their jobs, and in being able to make some direct measurement which will help to ensure that the product is exactly what it should be.

When, as is usually the case, the temperature of cooking of an icing, or the temperature of the ingredients going into an icing, or the temperature of an icing at the time it is put on a cake is of prime importance, it must be watched with the same scrupulous exactitude that characterizes the whole quality control program. Just as in mixing batters, sufficient refrigeration in the icing room to maintain constant temperatures in the neighborhood of 60 deg. F. should be provided for making those icings, such as the butter cream types, which require lower-than-room temperature during mixing. The density of the finished icing is likewise a very critical factor in the quality of the icing and should be checked by the same method as that used for measuring the density of batters.

Unless all these factors that contribute to the make-up of the finished product are held within relatively narrow limits, the limits that experimentation has shown will give the desired product, it is futile to speak of any real quality control program. Quality control must not stop with the initial laboratory inspection, nor with the purchases order; it must carry all the way through the production processes if it is to fulfill its function of influencing the customer.



Sentinels of quality control. Laboratory apparatus is the *sine qua non* of controlled quality. But there must also be a systematic procedure for testing raw materials and finished products. And the technologist in charge must have authority to put his findings into effect.

Partly, also, the control of quality is a matter of training personnel into using the methods that have been set as giving the best results. And by this is meant using these methods with unvarying uniformity, step by step, day in and day out. In every cake plant where quality control is deemed paramount, the production methods will be a matter of record, and that record will have some of the attributes of the laws of the Medes and the Persians.

A few plant managers will tell you that their help cannot possibly be expected to work to such close limits as described here. Their operators, they say, cannot be trusted to watch temperatures and cook to a definite read-

W. R. VAN METER

ing, time after time. The facts of the case, as this writer has seen them, are all against such arguments. Most plant operators both can and will acquire the sort of skill that is needed for quality control operations if the leadership they get from their superiors is persistent, determined and active.

The attitude of plant personnel toward the use of the utmost skill in their work is always a reflection of the viewpoint of the top executives. As Chaucer expressed it pungently years ago: "If the shepherd be dirty, how can the sheep be clean?"

Laboratory Control

The final step in the program is the check that the laboratory must constantly make upon the finished product. Daily, samples of every variety of cake baked in the plant the day before should be sent to the laboratory for examination and tasting. The sense of taste is highly developed in some people, and almost absent in others. Before giving the job of tasting to any individual, it is well to make certain first that the individual being considered for the work is not taste blind.

The samples of cake coming to the laboratory are examined by an experienced taster who notes comments as to eating quality and appearance of cake and icing. The comments resulting from this daily inspection should be posted each day on a large blackboard in the department where the product originated.

Once a week, samples of every variety made should come to the laboratory for a keeping quality test. This involves keeping one set of samples in an incubator held at approximately 95 deg. F., while a companion set is kept at room temperature. These samples are inspected daily. The time at which mold develops is noted, the behavior of an

icing is watched, the age at which cake or icing is definitely stale is determined. In this way, any incipient trouble developing in the product is quickly caught. The failure to follow established procedure in the production process shows up, either in the daily laboratory inspection, or in the weekly keeping quality test, and can thus be traced back to its source.

The probable behavior of a cake, or an icing, under weather conditions to be expected six months or so hence can be predicted in advance, and, if necessary, steps can be taken in ample time to clear up what might be a sore spot later on. In the same manner, by altering temperature and humidity conditions in the incubation cabinet, the keeping quality of specific items can be judged for definite territories in advance of distribution in those territories.

Monthly summaries of the daily cake inspection reports, and the weekly keeping quality reports, should be prepared by the laboratory. These summaries should go to the executive office and the production manager. They must be regarded in both places with very serious attention, for only upon that basis can any quality control program function. The men at the top of the organization must be interested, not with mere lip-service interest, but thoroughly and completely interested in making their product as nearly perfect as possible. Here, too, it is necessary that the head of the laboratory, charged with responsibility for conducting these control tests, have sufficient authority to see that the tests are not disregarded. How this is done, of course, is a matter for each organization to decide for itself. Emphatically the writer, through a chemist, does not imply that the laboratory should take over supervision of production. At the same time, there must be equality of status between the two departments when disputed questions are brought for decision to the man in the organization who has to decide such affairs.

Supplementing the laboratory's daily inspection of samples, there should be as much tasting as possible of the product on the part of the production manager's office and the executive office. There should be full realization on the part of these men—and oddly enough, this realization is far from general in the baking industry—that they are engaged in making a food product, and that the final test of any food product is what it tastes like when it is eaten. Emblazoned on one wall of every department in the plant, there should be a paraphrase of the old saying: "The proof of the cake is the eating thereof."

Such detailed inspection and everlasting tasting is in great contrast to the practice in most baking plants. As a rule, no one individual has been assigned responsibility for tasting the product. What little tasting is done is usually haphazard and desultory anyway, with no one in the organization getting very much wrought up over the actual taste of the product.

But in the plant with a real quality control program, it will never be forgotten that the cash customer judges a food by the way it tastes when he or she eats it.

The same close attention to eating and keeping quality must be maintained when formula changes are made, or when new products are considered for manufacture. Regardless of the apparent value of a proposed change, it should not be made without careful study of its effect on flavor, eating and keeping quality of cake or icing. No changes should be made in the source of supply for raw materials without the same consideration. Once again, it should be the responsibility of a single individual to okay formula changes. The head of the laboratory, or the individual charged with the functioning of the quality control program, should also assume this responsibility.

This, also, is in contrast to the method common to the baking industry, where formula changes are largely on the basis that: "If the customers don't kick, and the stale returns don't jump, the change is all right."

In all of this, the laboratory's part has been mainly that of control work, setting up standards that must be met, establishing the checks that will make certain those standards are conformed to, and then pursuing a steady course of constant inspection. However, under the guidance of a competent food technologist, there is much more that the laboratory must offer to a plant's quality control program.

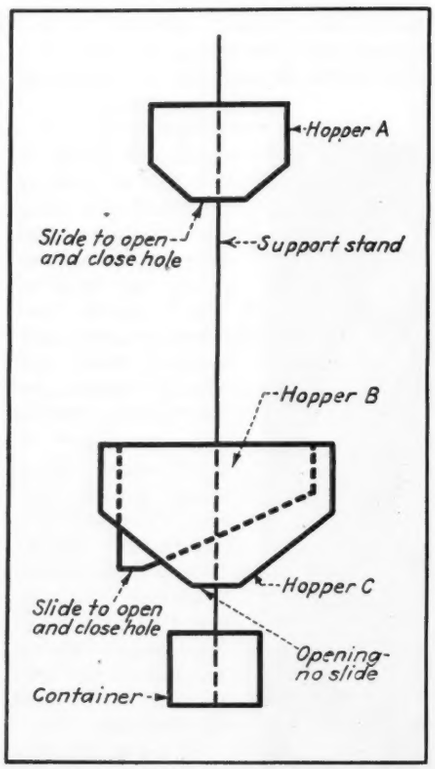


Fig. 1. Volume tester. Hopper B is filled with rapeseed, which is leveled off with a straightedge. The seed is then transferred to hopper A and the cake whose volume is desired is put into hopper B. Then the seed is emptied from hopper A into hopper B and again leveled off. The seed displaced by the cake falls into hopper C and into a container underneath. Its volume can be measured in a graduated flask, giving the volume of the cake.

Research Program

The laboratory must keep looking ahead in a practical research program of its own. It must pass judgment on new materials, new methods. It must be facile in inventing new materials and methods on its own hook, especially adapted to the use of the plant and the particular products of the plant. It must not only offer criticism of the product, but it must go a long way to eliminate the causes of the very criticism which is part of its job to make.

The expense of such control and development work as outlined here is relatively small. As a matter of fact, it is not unusual in the experience of those companies which have equipped a laboratory, and installed a good food technologist to head it, that the byproduct activities of the laboratory in the first year will pay installation costs and the chemist's salary as well.

Reputations for a food product like cake can only be made on a basis of skilled, persistent and intelligent work. There is, in baking, no magical formula, no secret ingredient, no gimcrack which will automatically ensure a product of superlative quality. Higher quality can only be gained by closer control over the score or more variables which affect production. The modern food industry of baking requires fully as much care, skill and technical know-how as the production of alloy steels or high-test gas.

Today the bulk of the cake market still remains in the hands of the housewives of the nation. It is the belief of this writer, that tomorrow if some such thorough, scientific quality control program as outlined here were generally adopted by the baking industry, the picture would be dramatically changed.

What's Known Today About Dehydrating Vegetables

By W. V. CRUESS

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E. M. MRAK

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PART IV*—Specific directions for preparing various vegetables for drying are given in this instalment of a series of articles which will constitute a "handbook" on vegetable dehydration **

Green Lima Beans—The vines may be harvested when the beans are at optimum maturity and may be shelled directly from the vines by a pea vining machine as for canning. A bush bean of good variety should be grown for the purpose. The shelled beans should be sorted to remove overmature beans, which may be dried separately. The beans are spread on screen trays, blanched in steam 8 to 10 minutes and dehydrated at not above 150 deg. F. to less than 5 percent moisture.

Jerusalem Artichokes—The Jerusalem artichoke is a root vegetable of the sunflower family. It resembles the potato in appearance, although much smaller and of more irregular form. At one time considerable quantities were dehydrated for use by diabetic persons because it contains no starch, but instead, inulin, which is a starch-like substance that yields fruit sugar, levulose, on digestion. It is believed that diabetics can utilize this sugar to better advantage than corn sugar, dextrose, the sugar formed from starch on digestion. However, interest in dehydrated Jerusalem artichokes appears to have died out.

Nichols[23] conducted a comprehensive investigation on the dehydration of this vegetable. His recommendations follow:

Jerusalem artichokes should be peeled in a rotary, abrasion peeler, and hand trimmed. Prolonged soaking of the peeled or sliced tubers should be avoided. They are then sliced, trayed at the rate of about 1.5 lb. per square foot, steamed about 4 minutes and then dehydrated. If unblanched the product darkens rapidly during dehydration. The finishing temperature should not exceed 160 deg. F. and the final moisture content should not exceed 5 percent.

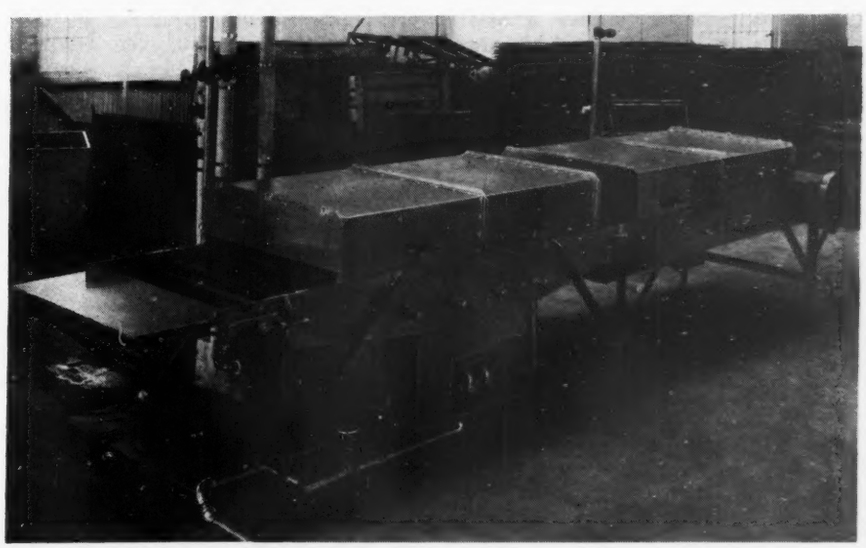
Kale, Parsley, Beet Tops, Chard and Mustard Greens—These are treated similarly to spinach. The leaves are sorted; trimmed; thoroughly washed; spread on trays; blanched 3 to 5 minutes in live steam and dehydrated at not above 150 deg. F. to less than 5 percent moisture.

Leeks—These are prepared and dried as described for onions.

Mushrooms—Dried mushrooms are used very generally for the flavoring of foods. For the most part the supply in normal times is imported from overseas.

For drying, the mushrooms should be young, of medium size and freshly gathered. The "gills" should be pink, free of insects and decay and not blackened. Naturally, if the mushrooms have been gathered in the fields great care must be taken that only the edible variety is taken. *Mistakes are apt to be fatal!*

If the stalks are tough and woody they should be cut off and discarded. If tender they may be cut in short sections



Tray washer in the modern new vegetable dehydrating plant of Dry-Pack Corp. at San Jose, Calif.

* See Part III, *Food Industries*, March, 1942, page 48, for directions for drying other vegetables not covered in this article.

** This series of articles on the dehydration of vegetables is largely a compilation of the information existing at the time the manuscript was prepared. Research will undoubtedly bring about changes, but for the present the series constitutes a complete and up-to-date "handbook" on vegetable dehydration.

for drying. Small mushrooms and "buttons" need not be peeled. The larger ones are more satisfactory if peeled. This is done by hand. Usually the mushrooms, minus the stems, are dried whole, unless of large size, in which case they may be sliced. They should be blanched to prevent undue loss of flavor and toughening. This is done by steaming 5 to 10 minutes on Monel metal screen trays. They should be dried at not above 150 deg. F. to not less than 4 percent moisture. The unblanched are more attractive in appearance than, but inferior in flavor and cooking quality to, the blanched.

Onions—At present considerable quantities of onions are dehydrated and converted into onion powder for use commercially in flavoring canned soups and meat products and for use by restaurants, hotels and other large dispensers of foods. Some of the powder is also mixed with table salt and used in the home as "onion salt." The sliced dehydrated onions may be used for most purposes for which the fresh are used; e.g., for flavoring various dishes, for frying and creaming, etc.

The outer paper-like layers are removed by hand, by agitation in an abrasion peeler such as used for potatoes, or in a rotating screen cylinder. The ends are trimmed off and the onions sliced thin by a mechanical slicer. They are spread on trays, about 1.25 lb. per square foot.

If a very light color is desired the sliced onions may be spread on wooden-slat trays and exposed to the fumes of burning sulphur for 20 to 30 minutes. Sulphuring may diminish the flavor considerably and is usually not considered advisable.

Nichols *et al*[22] recommend steam blanching on screen trays for a short time, about ½ to 1½ minutes. Fellers[24] recommends blanching in water for two to four minutes; but the present writers find that such treatment gives a less desirable product and a lower yield than short steam blanching. Too prolonged blanching results in serious loss of flavor and odor. For production of powdered onions blanching is usually omitted.

Onions are very susceptible to heat injury. Therefore, the finishing temperature should not exceed 140 deg. F. The final moisture content should not be above 3 percent, particularly if the onions have not been blanched.

For powdering they are dried bone dry and then powdered in a hammer mill and sifted in a dry room. To prevent caking starch is sometimes added; a small amount of powdered tricalcium phosphate added to the powdered onion will also prevent caking. If used for onion salt in shaker containers considerable added starch or other cake-preventing agent is required. The powder should be sealed in airtight containers to prevent absorption of moisture with consequent deterioration in color, odor and flavor.

Okra—Okra is also known as "gumbo" and is often used in soups and stews. The pods are sorted, washed, trimmed and sliced crosswise in slices ⅛ to ¼ in. in thickness. They are spread on screen trays at the rate of about 1.23 to 1.5 lb. per square foot; steamed 4 to 8 minutes; and dried at not above 150 deg. F. The final moisture content should not exceed 5 percent.

Parsnips—This vegetable is prepared and dehydrated as described for carrots. Only tender roots free of woodiness should be used.

Peas—As for canning and for frozen pack, peas for drying should be young and tender and of a sweet rather than a starchy variety.

When the majority of the pods are well filled, but the peas still sweet and tender, the vines are cut and the peas shelled, and cleaned by the machinery used for preparing them for canning. They should not be allowed to stand after shelling because they rapidly lose their sugar and deteriorate in flavor; therefore, they should be blanched promptly. They are spread on screen trays, the load being about 1 lb. per square foot. The customary blanch is 1 to 2 minutes in boiling water or 3 to 5 minutes in live steam; but we prefer steam blanching for 5 to 10 minutes. The skins of more mature peas are apt to burst during long blanching. The longer the period of blanching the more readily the dried peas absorb water and the more rapidly will they cook.

They should be dried bone dry, to less than 5 percent of moisture, at not above 150 deg. F. Peas sometimes case-harden during drying when the humidity is too low or the temperature too high.

Peppers and Pimientoes—Chili peppers (hot red peppers) are dehydrated in large quantities in Southern California for use in flavoring tamales, enchilades, chili beans and other Mexican dishes. Pimientoes (sweet red peppers) are dehydrated and powdered, the powdered product being known and widely used as paprika. Some dried chili peppers are also powdered and used under the name of Cayenne or red pepper.

The usual chili drier is of the kiln type. It consists of a furnace and heating pipes below the ground level. Cars of coarse screen trays of peppers stand above the heating system. The heated air rises through the trays and escapes through several stacks in the roof. An attempt is made to maintain a temperature of about 180 deg. F. Drying is slow and uneven; the peppers on trays near the bottom of the cars dry more rapidly and are apt to become overdried and scorched. First-quality dried peppers must be of bright red color and free of darkening and scorching.

Holmes[25] has described the drying of peppers in modern, air blast tunnel dehydrators. These consists of two tunnels side by side. One tunnel receives the fresh peppers on cars, one ton of peppers per car. The air enters this tunnel at 180 deg. and much of the moisture is removed. The heated air enters the second tunnel at 150 deg. F. and in it the cars of partially dried peppers from the first tunnel are placed for finishing. Thus, there is no danger of scorching, and drying is rapid. Holmes reports the drying time as 20 hours and

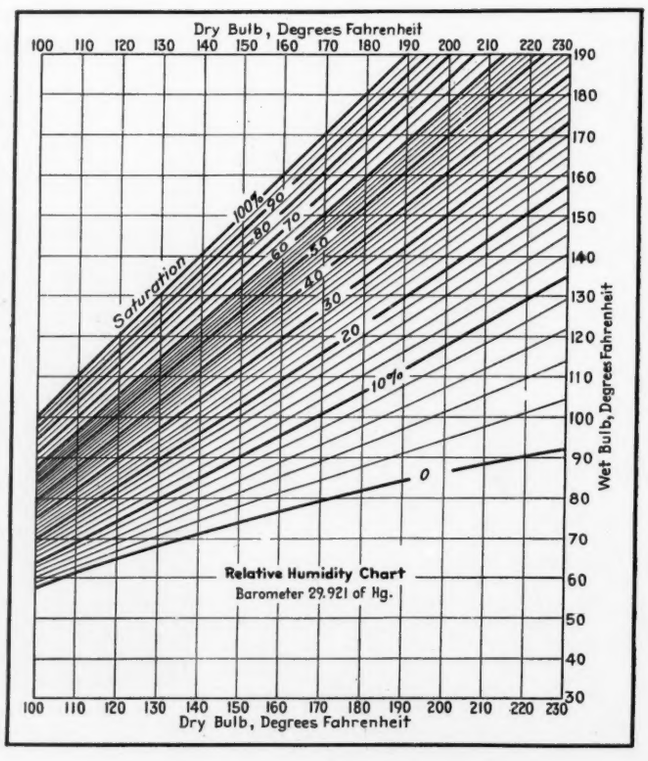


Chart for determining relative humidity from dry-bulb and wet-bulb temperatures.

drying costs per dry ton as $13. The drying ratio is about 4 to 1.

Chili peppers are apt to darken badly during drying if the relative humidity is high. In order to prevent darkening some operators do not recirculate the air.

Since the peppers must be sprayed with lead arsenate to control the pepper weevil, it is necessary to wash them in dilute hydrochloric acid and then in water to remove the spray residue. Machinery manufacturers can supply such washers. They are similar to those used for pears and apples.

In commercial practice neither pimientoes nor peppers are blanched.

Potatoes, White—For dehydration, potatoes should be of good quality and free of rot, sprouted, sunburned or otherwise unfit tubers.

They should be roughly graded for size and thoroughly washed. They are then peeled and washed in a rotary, abrasive-type peeler. The washings contain the grated peel and considerable starch which can be recovered by settling.

The peeled potatoes must be trimmed to remove eyes and bits of peel or bruised tissue. If not sliced immediately they should be covered with cold running water.

They are sliced about $\frac{1}{8}$ to $\frac{3}{16}$ in. thick by mechanical slicer or are diced. They are spread on screen trays and washed thoroughly under sprays of water to remove the surface coating of loose starch; unless removed the starch will spoil the appearance of the dried product. The tray load is about 1.25 lb. per square foot.

The potatoes may then be blanched in steam until cooked through but not until they are mealy; usually 5 to 7 minutes. However, potatoes respond well to blanching in boiling water; the blanching period being about 4 to 6 minutes. They may also be blanched at 190 to 200 deg. F. for about 8 minutes. Unblanched potatoes attain an undesirable dull, starchy and irregularly darkened appearance when dried.

The finishing temperature should not exceed 150 deg. F. The final moisture content should be not above 5 percent.

In drying potatoes by the flaking process for the manufacture of potato flour the procedure is as follows, according to Noel.[26] U. S. No. 2 quality potatoes are washed, mechanically peeled, trimmed and sorted, steamed until soft, usually in an autoclave at 15 lb. pressure for 15 to 20 minutes, washed, spread in a thin layer on the surface of a revolving hot steel drum, dried and scraped from the drum continuously, then ground to a powder and bolted. The drying drum consists of a large revolving steel cylinder with a smooth surface. It is heated by steam at 80 lb. or more pressure, confined within the drum. Thus, the surface is at about 325 deg. F. or above. Small, steel rollers spread the mashed potatoes in a thin layer on the surface of the drum. Stripper blades set against the drum remove the dried flakes. Potato flour is useful in baking.

Riced potatoes are prepared by steaming the peeled potatoes until soft, then passing them through a sausage grinder with a perforated end plate through which the mashed potatoes are extruded in "strings" onto the trays. They are dried in that form in a dehydrator and may be used in preparing mashed potatoes and in soups.

A relatively new procedure for the spray drying of potatoes has been described by Bowen.[27] The tubers are washed in a squirrel-cage washer, cooked and then passed through an extruder to remove the skins and prepare a mash which is conveyed into a mixing tank. Water is then added to make a free-flowing soup-like mixture which is passed through a finisher into storage tanks where it is held at a relatively high temperature until removed for drying. The soupy mixture is atomized into a fine mist and dried in a blast of air almost instantly. The small dried particles fall to the bottom of the drying chamber and are then removed in a blast of warm out-going air.

The dried product has been used successfully in bread. It promotes the growth of yeast.

Such a process should find use in the preparation of other vegetable powders.

Potatoes, Sweet—Caldwell, Moon and Culpepper[28] describe the drying of sweet potatoes as follows:

The potatoes are sorted, washed, peeled by abrasive machine or in a hot lye solution, washed, trimmed, sliced, spread on screen trays, steamed until cooked through (20 to 30 minutes) and dehydrated at 130 to 165 deg. F. to less than 10 percent moisture content. Nichols *et al*[22] recommend steam blanching for only 6 to 8 minutes. Caldwell and associates recommend that the sliced, raw potatoes be dipped in dilute citric acid solution to prevent darkening until they are steamed.

Riced sweet potatoes, flour and sweet potato flakes can also be made as described for white potatoes, according to Mangels and Prescott.[29]

Pumpkin and Yellow Flesh Squash—In California, at one time, a considerable quantity of pumpkin flour was made commercially for use in pies; but its production has long since been abandoned. The Connecticut Field Pumpkin and the Boston Marrow Squash were used. Christie[30] describes the process then in use, as follows: The pumpkin and squash were trimmed to remove stems and blossom points; were then chopped open; the fiber and seeds were scooped out; the pieces were then shredded in a kraut slicer or sliced in pieces about $\frac{1}{4}$ in. thick in a rotary slicer or ensilage cutter; spread on trays; dehydrated to bone dryness at a finishing temperature of 160 deg. F.; cooled; ground at once in a hammer mill; bolted on a 90 to 100 mesh screen; and sealed in friction-top cans. He states that it is unnecessary to peel the pumpkin and squash for making flour, but that blanching for about 4 minutes in live steam gives a product of better color, flavor and cooking quality.

If for use as a table vegetable, the pumpkin and squash should be peeled. This must be done by hand. The pieces are sliced and steamed 4 to 6 minutes before drying.

Rhubarb—This vegetable when dried is apt to be rather stringy and tough. Only young tender stalks should be used; a red color is preferred. These are trimmed, washed, cut transversely in pieces about $\frac{3}{4}$ to 1 in. long, spread on Monel metal or other resistant metal screen trays, steamed 3 to 4 minutes and dehydrated at not above 160 deg. F. to low moisture content. Or the pieces may be blanched in steam or in boiling water about 2 minutes and spread on wooden-slat trays. Galvanized screen must not be used as the acid dissolves the zinc coating.

Sauerkraut—Cabbage is shredded in a kraut slicer and is converted into sauerkraut by the usual procedure by fermenting several weeks with about $2\frac{1}{2}$ percent of salt. It is then drained, trayed on Monel metal screens, steamed for 10 to 15 minutes and dehydrated at not above 150 deg. F. to less than 5 percent moisture. Or it may be steamed and spread on wooden trays for drying.

Spinach—Spinach must be blanched thoroughly before drying. Poorly blanched, dehydrated spinach is of objectionable hay-like flavor and odor and does not absorb water properly nor cook satisfactorily.

Young, tender heads are trimmed to remove butts and unsuitable leaves, sorted, washed very thoroughly to remove sand and insects, spread on screen trays at the rate of about $\frac{1}{2}$ lb. per square foot and steamed 3 to 5 minutes, *i.e.*, until heated completely through. Dehydrate at not above 150 deg. F. to less than 4 percent moisture. The leaves are then brittle and shatter badly in packing. Nichols and Powers[31] therefore recommend slight moistening to render them flexible. This is done by injecting steam into cool air to give 90 to 95 percent relative humidity. The

(*Turn to page 98*)

1 Bellies which have been cut out of the chilled hog carcasses on the main cutting line are here being carefully trimmed by trained operators. Only about 60 percent of the roughly cut out belly is in one slab of top-quality bacon.

2 Close-up of the belly trimming operation shown in picture 1. This operation looks easy, but it requires considerable skill and judgment.

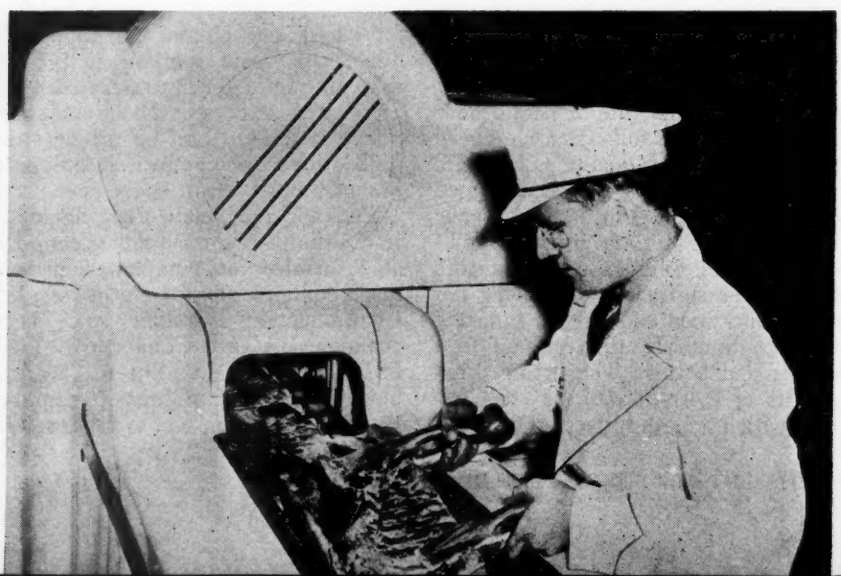
5 After curing, each belly is trademarked by a branding iron on the skin side and by a vegetable-ink marker on a fat edge. Needle-like points pick up ink from a brush and transfer it to the meat to form the trademark along the edge.

PICTURES OF

● Top-quality bacon is the prima donna of selected meat be cured and smoked with judgment, tamination with mold and bacteria. Swift & Co.'s sanitary conditions by scrupulously clean, uni- the meat. Yet with all this emphasis on quality, meet competition. There are ideas here for other

6 The trademarked bellies, clamped on comb hangers, are hung on racks that travel into the smokehouse by trolley and overhead rail. In the smokehouse the meat is subjected to filtered, hardwood smoke for 20 to 36 hours at 115 to 145 deg. F. to develop a characteristic smoked flavor. Here the bacon is being taken from the smokehouse to be chilled preparatory to wrapping as a slab or to slicing for packaging.

7 When it comes from the smokehouse, bacon is sterile with respect to molds, yeasts and common bacteria. It remains relatively sterile during the chilling and other handling operations. To maintain that degree of sterility during slicing operations, the slabs are held and skinned in a washed-air room and fed onto the slicer conveyor with sterilized metal tongs by a sanitarily attired operator.



3 Each trimmed belly is carefully weighed. Size, weight and ratio of lean meat to fat are factors in grading for quality and in determining the kind and length of cure.

4 Layered in a 3x5x3-ft. paper-lined and covered corrosion-resistant metal box, the bellies are dry cured in a mixture of table salt, sodium nitrate and sugar for 20 to 40 days at 36 to 38 deg. F. The curing mixture is sprinkled generously between layers on the fleshy sides of the bellies.

PROCESSES

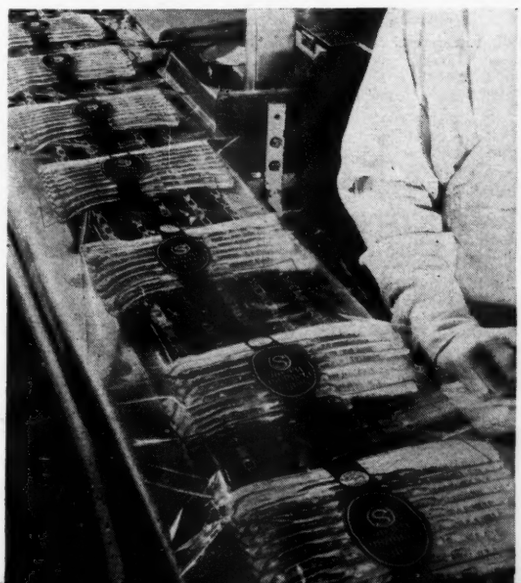
the packinghouse. Not only must carefully but precautions must be taken to prevent con- Premium bacon is sliced and packaged under formed employees whose hands never touch the operations are efficient. They must be to food manufacturers.

PHOTOS COURTESY OF SWIFT & CO.

9 With easily operated sterile metal tweezers, inspectors replace the torn or slab-end strips and place the packets of bacon on a belt conveyor which takes them to check-weighers for accurate adjustment.

10 After adjusting the weight of each packet of bacon to 8 oz., the check weighers place the packets on a belt conveyor from which they are taken by wrapping operators. Slices are arranged to give pleasing appearance and are fully wrapped in sheet cellophane without being touched by operators' hands. The completed packet is replaced on conveyor and carried to carton packing operator at end of packaging line.

8 From the slicer the bacon is dropped in approximately ½-lb bunches, loosely covered with printed cellophane, onto a link conveyor which carries it to the inspectors.



Tests Reveal Faulty Retorting Practices*

By O. F. ECKLUND, H. L. ROBERTS and H. A. BENJAMIN
Research Department, American Can Co., Maywood, Ill.

Unless practices are followed which permit proper distribution of the heating medium, full sterilizing value is not attained in retorting luncheon meats. It is a mistake, for example, to tightly pack rectangular cans into retort crates

TO produce a commercially sterile product the process or heat treatment must be sufficient to destroy those microorganisms which are capable of growth at shelf temperatures. Most non-acid canned foods are processed to result in sterilizing values (F_o) of 2.78 (measured in terms of equivalent minutes at 250 deg. F.) or more. Packers of luncheon meat, for reasons of quality, have seen fit to use lower sterilizing values, relying on the bacteriostatic effect of curing agents, and a rigid program of plant sanitation, to prevent losses through spoilage. One of the processes, suggested by the American Meat Institute for Federal Surplus Commodities Corp.'s pork luncheon meat in 6-lb. rectangular cans, is 200 minutes at 230 deg. F. With a 15-minute coming-up period, this process has a sterilizing value (F_o) of 0.6. In order to obtain the full sterilizing value of this process, proper distribution of the heating medium must be effected, and it is the purpose of this paper to point out a number of factors influencing this.

Heat Distribution

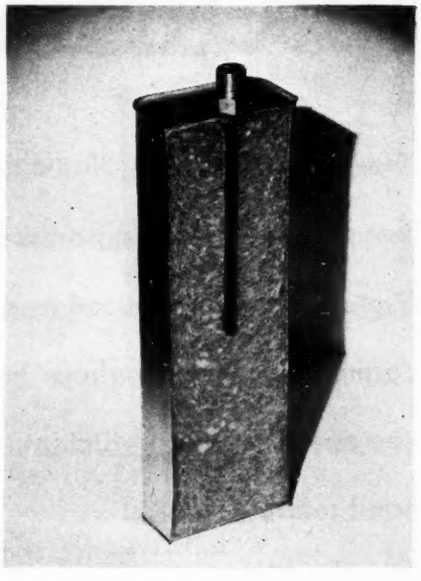
Tests have shown that, with a suitable retort hook-up and proper operation, satisfactory heat distribution is obtained in a retort loaded with round cans. The effect of heating of each can is uniform throughout the load because of the relatively small area of can-to-can contact surface. This is especially true of scrambled cans. On the other hand, the effective heating in a retort load of 6-lb. rectangular cans may be considerably less than satisfactory.

For reasons of steam economy and of maximum production, 6-lb. rectangular cans are frequently packed tightly into retort crates. The sides of the rectangular cans, which are inherently far less rigid than those of round cans, bulge out during processing. The interstices between the concave or "spanked-in" sides of the cold cans disappear to a considerable extent and the heating medium, steam or water, has access only to the free spaces at the corners of the cans.

A series of tests was made to determine temperatures between tightly stacked as compared to loosely stacked rectangular cans during processing. These tests were made in water, water with superimposed air pressure, steam, and a steam and air mixture. Special copper - constantan thermocouples which ringed the cans and had electrically insulated hot junctions were used in making measurements. This type of couple permitted the cans to be stacked as tightly as the end double seams allowed, yet the readings were not subject to interference by bare hot junctions touching can walls.

In each of the four conditions of processing there was a very definite lag in the temperatures between tightly stacked cans. Figure 1 graphically illustrates the difference in the effective heating between tightly and loosely stacked cans. It will be noted in Fig. 1, which is a steam cook, that there is a distinct temperature drop between tightly stacked cans in the early part of the process. The temperature decrease may be logically related to the bulging of the can walls and subsequent impeding of the free circulation of the steam heating medium. The same condition, but to a lesser degree, obtains in water processing.

Some packers of pork luncheon meat have contended that the rectangular



Heat-penetration thermocouple in 6-lb. rectangular can of pork luncheon meat.

TABLE I—Heat Penetration in Pork Luncheon Meat

Type of process	Stacking	Process time at 230 deg. F. for $F_o = 0.6$	F_o for inst. come-up	Can center temperature at steam-off	f_h	j
6-lb. rectangular cans — process 205 min. at 230 deg. F.						
Water process 10 lb./sq. in. by use of superimposed air	Loosely packed	216	0.42	214.5	157	1.69
		205	0.60	217	155	1.49
	Tightly packed	224	0.34	213	174	1.39
		209	0.50	216	159	1.48
Water process 7 lb./sq. in.	Loosely packed	205	0.60	217	149	1.71
		213	0.47	216.5	153	1.64
	Tightly packed	232	0.22	211	176	1.52
		230	0.27	211.5	173	1.50
Steam process 7 lb./sq. in.	Loosely packed	205	0.60	217	148	1.68
		200	0.71	219	136	1.92
	Tightly packed	220	0.40	214.5	163	1.55
		220	0.38	214	166	1.52
2½-lb. round cans — process 170 min. at 230 deg. F.						
Water process 10 lb./sq. in. by use of superimposed air		164	0.65	219.5	112	1.84
		173	0.54	218	114	1.98
		165	0.67	220	110	1.87
Steam process 7 lb./sq. in.		171	0.56	218	116	1.82
		172	0.54	218	115	2.05
		170	0.60	218.5	112	2.02

Note: The different sets of data for the same condition represent different cans in the same retort. All cans given the same process were in the same retort load.

* From a paper "Some Observations on the Retorting of Luncheon Meats," presented before the Meat Section of the National Canners Association Convention.

cans must be processed in water with superimposed air pressure, or in steam with added air pressure in order to obtain the desired yield in the processed product. The theory, which has undoubtedly been based on some evidence, is that the excess pressure afforded by the air keeps the can walls from bulging, a condition believed conducive to maximum yield. Since these tests did not cover a large range of processing pressures, it is not known just what pressure is needed to keep the can walls "spanked-in." It is known, however, that from 4 to 6 lb. of added air pressure at a temperature of 230 deg. F. will not entirely prevent the can walls from bulging, since in using these pressures the insulated thermocouple wires were pressed flat by the pressure of bulging cans. This amount of added or superimposed air pressure is that commonly employed in the industry. Yield data, which will be discussed later, further indicate that the use of added air pressure in the range now employed has little significant value.

Processing in a steam and air mixture is a practice that should be discouraged unless it can be shown that the retort hook-up is such as to maintain even heat distribution throughout the retort with no possibility of the formation of air pockets. This is a very difficult condition to meet. Figure 1 shows the uneven heat distribution in a two-crate vertical retort in which 6 lb. pork luncheon meat was processed in a steam and air mixture. The loosely packed cans were distributed systematically throughout the load. At a point near the end of the process the air was shut off and the retort was vented through the blowoff valve for about two minutes. Temperatures at all of the thermocouples converged to the indicated processing temperature and immediately diverged when the air was again turned on.

Processing in water involves the use of special retort control devices for maintaining proper temperature and pressure and provision to insure even heat distribution in the retort during processing. Air, entering through the steam spreader, is the most commonly used method of agitating the water. Tests were made in a retort loaded with 6-lb. cans tightly stacked, using water as the heating medium, to study the effect of air agitation on heat distribution. In one run the water was not agitated. Under these conditions there was a temperature spread ranging as high as 5 deg. between systematically located thermocouples. When compressed air was piped into the steam line at a rate of 2 cu. ft. per minute, heat distribution tests showed only a 2-deg. spread in temperature throughout the retort. This would indicate that agitation is desirable in water-processing 6-lb. cans. On the other hand, tests have shown that uniform heating is obtained in processing 2½-lb. round cans without the use of air agitation. The natural convection currents are more free to circulate around the round cans than the rectangular cans.

Some packers have installed injectors in the steam lines, the purpose of which is to draw air from the headspace in the retort and mix it with the steam entering the bottom of the retort. The velocity of the steam through the injector determines the amount of air which will be circulated. Tests made by installing a flow meter in the line from the retort headspace to the injector showed that under the conditions of retort operations, there was no flow of air from the retort to the injector. Actually, the steam backed up through the injector to the check valve in the line. In order to bring the retort up to temperature in a reasonable length of time, the nozzle of the injector has to be large enough so that it will not appreciably cut down the flow of steam to the retort. In fulfilling this requirement the velocity of steam through the injector was not sufficient to promote circulation of the air in the retort. It seems unlikely that an injector will pass enough steam to permit a reasonable come-up time and still function when the steam valve is throttled during processing.

TABLE II—Yield in Pork Luncheon Meat Given Bacteriologically Equivalent Processes.

Process	Per-cent yield 6-lb. can	2½-lb. can
Steam	95.0	90.9
7 lb./sq. in.	93.2	92.7
	92.4	92.2
	95.2	91.6
	86.5	92.6
	84.9	89.5
Av.	91.2	Av. 91.6
Water at 10 lb./sq. in.	95.4	93.5
by use of	96.9	93.4
superimposed air	88.7	91.2
	85.6	92.9
	96.8	86.5
	98.7	94.3
Av.	93.7	Av. 91.9
	Processes used	
Steam	190 min. at 230 deg. F.	160 min. at 230 deg. F.
Water and air	180 min. at 230 deg. F.	150 min. at 230 deg. F.

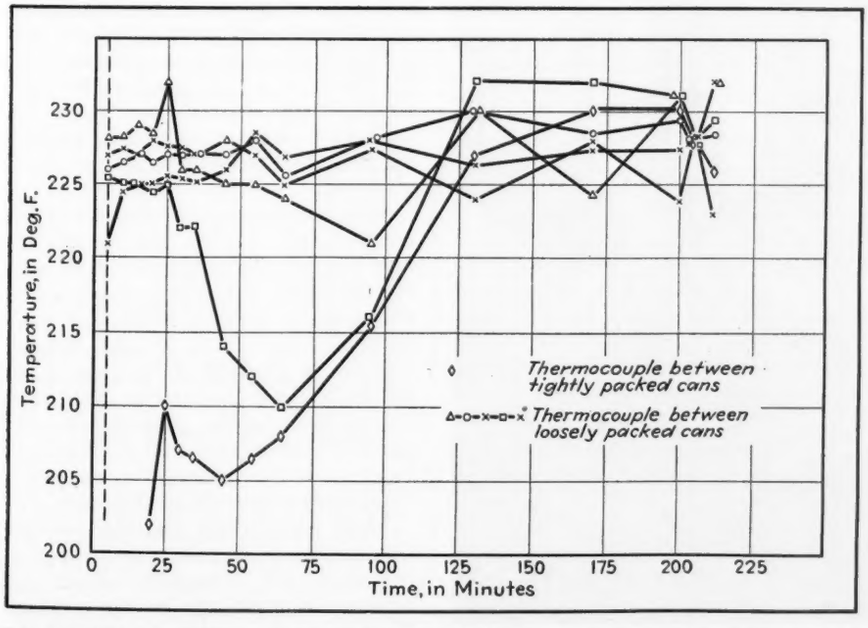


Fig. 1. Effect of stacking on apparent heat distribution in retorting 6-lb. cans of pork luncheon meat in steam and air at 228 deg. F. (two-crate vertical retort).

Heat Penetration

While it is interesting to know what is happening on the outside of the cans, it is more important to know what conditions obtain inside the cans. At the same time that temperature distribution in the retort was studied the temperatures inside these cans around which the special thermocouples were wrapped were also recorded. The slowest heating part of the can, the geometric center, was the point at which all heat penetration measurements were made. When temperatures were plotted against time on semilogarithmic paper, the heat penetration factors, f_h and j, shown in Table I, were derived. The factor f_h is the slope of the heating curve and is measured in minutes required to traverse one lag-cycle; j is the expression for the lag in the rate of heating at the beginning of a process.

F_o expresses the sterilizing value of a process. It gives the total amount of heat to which the slowest heating part of the can has been subjected as converted to the equivalent number of minutes at 250 deg. F.

The slopes of the heating curves for 6-lb. pork luncheon meat in the three types of cooks employed show a marked difference between tightly stacked and loosely stacked cans. The average slope of the curves for the loosely stacked cans is 149 minutes, while the average slope for the tightly stacked cans is 168 minutes, including all types of processes. This means that in the range of commercial processes for the 6-lb. product a 10 to 20 minute longer processing period is required to effect the same sterilizing value in many of the tightly stacked cans than is obtained throughout the retort load in the loosely stacked cans.

The 2½-lb. round cans exhibit a series of heating slopes which are entirely within the limits of experimental error and product variation. The heating medium has easy access to the cans with the result that all the cans heat more or less uniformly.

Yield

The amount of shrinkage which takes place in the can during processing of sterile pork luncheon meat is of major concern to all packers of the product. The severity of the process has been claimed by some packers as the chief cause of shrinkage. Others believe that the present processes could be substantially increased without increasing the amount of shrink. There can be little doubt that the heat treatment of the "sterile" process renders out more juice and fat than do the cooks for the refrigerated product. However, it has been our experience that variations in processing times and temperatures within commercial limits do not significantly affect the amount of shrinkage in the sterile type product. For instance, in one particular experimental pack in which a process of 3½ hours at 235 deg. F. was used for 2½-lb. pork luncheon meat, satisfactory yields were obtained. This process has approximately 15 times the lethal value of the A.M.I. suggested process for F.S.C.C. luncheon meat of 160 minutes at 225 deg. F. for 2½-lb. round cans.

Variations in processing temperatures, within the limits tested, do not significantly affect the yield. Forty 2½-lb. cans of luncheon meat were taken from the same batch of meat and divided into equal lots. One lot was processed for 150 minutes at 240 deg. F. and the other was given a bacteriologically equivalent process of 170 minutes at 230 deg. F. The average yield of the 20 cans given the 240-deg. process was 95.9 percent, with a minimum of 93.8 percent and a maximum of 97.5 percent. The average yield of the 20 cans given the 230-deg. process was 96.8 percent, with a minimum of 93.2 percent and a maximum of 99.7 percent.

Earlier mention was made of the relationship between yield and added or superimposed air pressure during processing. Tests were made to study this and the yield data are recorded in Table II. All of the processes listed in Table II have the same sterilizing value, the differences in processing times used being due to differences in the come-up periods. The water processes having the longer come-up times require shorter processing times at retort temperature.

The data obtained indicate that there is no significant difference in shrinkage in 6-lb. cans when processed in steam or in water with superimposed air pressure, the processing methods most commonly used. As would be expected, the yield in the rigid round cans was not affected by the type of process. Of particular note is the large can-to-can variation in yield in cans from the same batch of meat processed in the same retort load. Because of this variation—as high as 13 percent—the difference between the average yields obtained in the two types of processes is not significant. For instance, the addition of one more can with a minimum or maximum yield would reverse the average relationship.

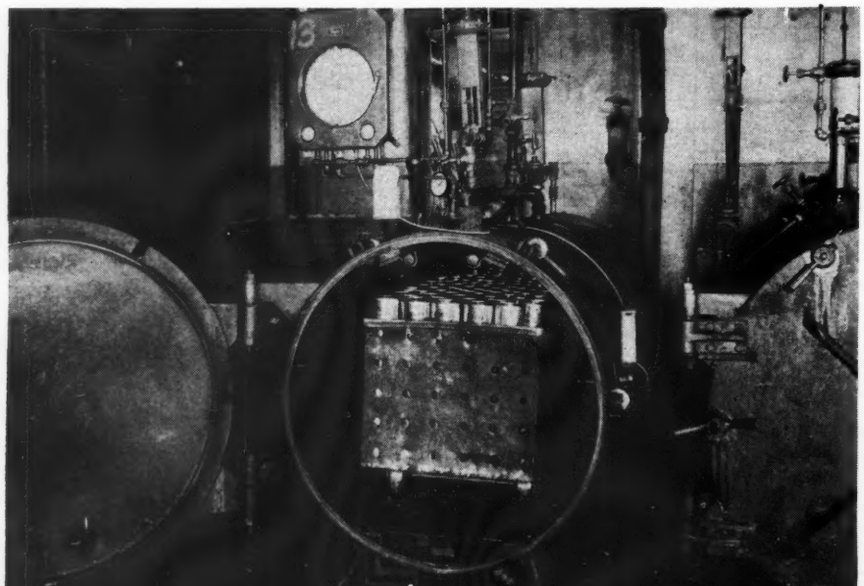
When all other conditions are equal, as limited by the extent to which experimental control can make them so in studying problems of this type, it is known that one batch of meat coming from the curing rooms may be processed and have appreciably greater or less yield than a batch immediately following. The answer to satisfactory yield appears to be in the quality, selection and preparation of the meat before it reaches the canning room.

Summary

Spiced pork luncheon meat in the larger can sizes is a relatively new addition to the group of canned meats not requiring refrigeration. Heat treatment alone is not sufficient to protect the product against spoilage; reliance must be placed in a rigid program of plant sanitation and the judicious use of curing agents. Some aspects of the processing of pork luncheon meat have been discussed.

The temperatures in the retort between tightly stacked 6-lb. rectangular cans during processing were considerably less than the indicated processing temperature. Bulging of the can walls inhibited free access of the heating medium to all parts of the cans. Consequently, heat penetration tests have shown that tightly packed 6-lb. rectangular cans require a 10 to 20-minute longer process to receive the same sterilizing value as loosely stacked cans.

Yield data, while variable, indicate that added air pressure during processing does not materially reduce the amount of shrinkage in the product. Neither is the yield affected by the heating media, i.e., steam or water.



Two-and-one-half-pound cans loaded in retort ready to be processed.

Data and Regulations On Use of Egg Yolk

By B. I. MASUROVSKY
Consulting Dairy Chemist, New York, N. Y.

Egg yolks are rich in nutritive elements, act as an emulsifying agent, give distinctive flavor and save on sugar. Regulations covering use in ice cream cited and practical data given on quantities needed

THE function of egg yolk solids in ice cream is of dual significance. (1) Egg yolks are rich in highly nutritive elements, such as iron, calcium, phosphorus and other important mineral salts, as well as in vitamins A, B, D, E, G, nicotinic acid, and small quantities of vitamin K. (2) The lecithin combination as found in egg yolk acts as a very desirable emulsifying agent and aids in the whipping of the ice cream mix, as well as in forming a fine emulsion of durable quality that results in a smooth, rich ice cream.

In the case of French type ice cream, wherein a greater amount of egg yolks is used than in the American type ice cream, egg yolk solids impart a distincitve custard flavor that blends with the cream and milk of the frozen finished product.

Egg yolks are used in the manufacture of spumoni, biscuit tortoni and other frozen desserts as prepared by high class caterers and trained hotel chefs.

Some saving in sugar is made by the use of egg yolk because the ice cream need not be as sweet as that without this rich and flavorsome ingredient.

Regulations

The Sanitary Code and Regulations governing the manufacture and sale of frozen desserts in New York City declares that "French Ice Cream" or "Custard" or "Frozen Custard," or any other frozen dessert wherein representation is made that egg or egg product is used, is adulterated if it contains any artificial yellow color, or color simulating egg yolk, or if it contains "less proportion of clean, wholesome egg yolk solids than the equivalent of 5 doz. egg yolks to each 90 lb. of other ingredients used.

The State of New York Department of Agriculture and Markets goes a step further in its rules and regulations relating to frozen desserts. It declares that "frozen custard shall contain not less than 5 doz. of clean, wholesome egg yolks, or 1.5 lb. of wholesome, dry egg yolk containing not to exceed 7 percent of moisture, or 3 lb. of wholesome frozen egg yolks containing not to exceed 55 percent of moisture, or the equivalent of egg yolk in any other form, for each 90 lb. of frozen custard.

Completing the picture of the complications confronting the ice cream manufacturer is the necessity of his becoming familiar with some outstanding pointers as suggested by the Food and Drug Administration under provisions of the Federal Food, Drug, and Cosmetic Act.

In the Federal definitions and standards of identity of egg products, (see *Federal Register*, Vol. 4, No. 138, 1939) is this provision: "Egg yolks, liquid egg yolks, yolks, or liquid yolks are yolks of eggs of the domestic hen so separated from the whites thereof as to contain not less than 43 percent total egg solids, as determined by the method prescribed in "Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists," Fourth Edition, 1935, pages 297 and 298, under Total Solids. They may be mixed, or mixed and strained.

"Frozen yolks, or frozen egg yolks, are the food prepared by freezing yolks.

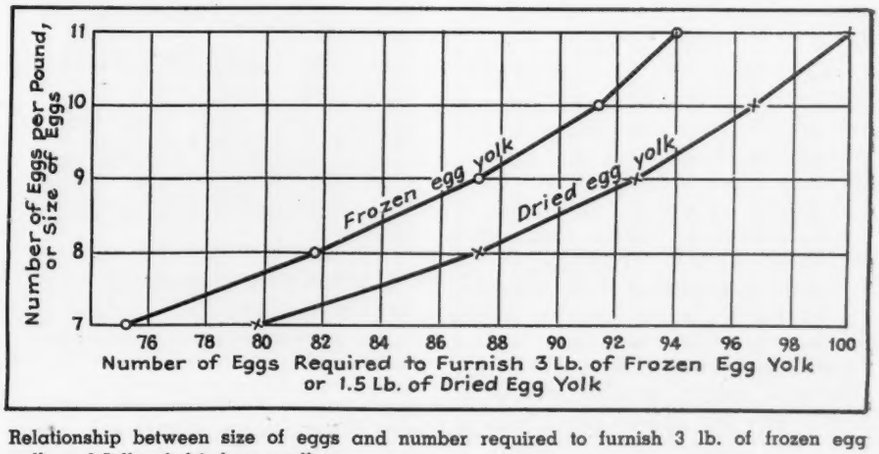
"Dried egg yolks, or dried yolks, are the food prepared by drying egg yolks. They contain not less than 95 percent of total egg solids."

From time to time objections are raised to a ruling based upon the use of an egg yolk solids equivalent to 5 doz. egg yolks to each 90 lb. of ice cream mix without mentioning the weight of the egg yolk. The size of the egg yolks will affect the weight, hence a comparative table showing the relationship

(*Turn to Page* 98)

TABLE I—Quantity of Egg Materials Produced From 100 Eggs of Different Sizes.

Eggs per lb. (No.)	Liquid eggs (lb.)				Dried eggs (lb.)		
	Yolk	White	Whole egg	Shell	Yolk	White	Whole egg
7	3.99	8.88	12.87	1.41	1.88	1.25	3.77
8	3.66	7.58	11.24	1.25	1.72	1.07	3.29
9	3.44	6.55	9.99	1.12	1.62	0.92	2.93
10	3.28	5.69	8.97	1.04	1.55	0.80	2.63
11	3.19	4.94	8.13	0.95	1.50	0.69	2.38



Relationship between size of eggs and number required to furnish 3 lb. of frozen egg yolk or 1.5 lb. of dried egg yolk.

New Trucking Hazards Call for More Safety

Older vehicles, poorer tires, inexperienced drivers and shortage of maintenance men will cause more accidents unless precautions are taken. Here are some pointers on what to do

FLEET OWNERS in the food industries should now take extra precautions to prevent truck accidents. Such precautions are needed to keep their automotive delivery and transportation expenses from increasing by reason of the greater accident hazards brought about by wartime conditions.

Traffic accidents increased 16 percent in the first 11 months of 1941, according to statistics of the National Safety Council. As our war effort is intensified, accidents, with their attendant expense in repairs, time out of service and delays in deliveries, will tend to increase still further.

Even though the ban on the purchase of new passenger cars, light trucks and tires may reduce the volume of traffic, the driving of older vehicles with tires in poorer condition than usual will put on the road many vehicles likely to have accidents due to mechanical or tire failures.

In addition, many new truck drivers will have to be employed to replace more experienced men drawn into the armed forces or transferred to new war industries. Other new men will be required to meet the increase in automotive transportation during the war emergency. Experience has definitely proved that the accident ratio for new drivers is much higher than for old.

Wartime conditions also make it more difficult to obtain experienced mechanical men to take charge of the increased maintenance made necessary by the inability to purchase new trucks. With new trucks unavailable, existing trucks will have to be used to the maximum extent, possibly on double shifts over the 24-hour day. This in turn will make it more difficult to schedule periodic check-ups and preventive maintenance work. And even with preventive maintenance properly scheduled, long delays in securing replacement parts may hold up the work.

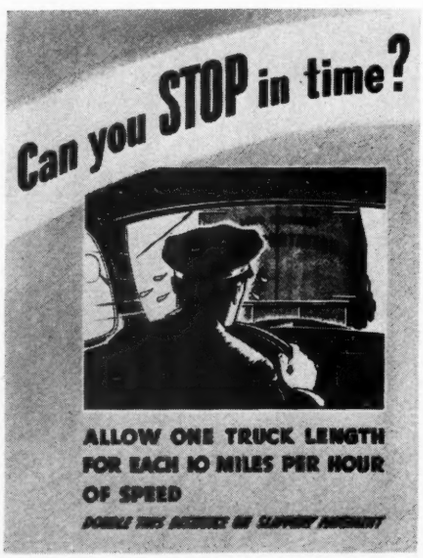
Other new hazards which tend to increase traffic accidents include congestion on existing highways on which or near which war plants are located and on roads leading to military camps served by food companies.

What To Do About It

All of these factors add up to increased repair costs due to accidents unless means are taken to offset the greater traffic hazards. Perhaps the most effective thing which can be done is to assign the responsibility for the fleet safety program to some one person.

The better trained or prepared the man assigned to the job may be, the better, of course, will be the results obtained. For small fleets, the work may be a part-time job. For fleets of 50 or more trucks, at least one full-time safety and personnel man will pay big dividends.

The work of such a man may be roughly dividend into two classifications, personnel training and the setting up of safety procedures and practices to fit present emergency conditions. One of the most effective ways to get results in the personnel training is to tie it in with our war effort and encourage safe driving and good mechanical work as a patriotic duty.



Safety posters, like this one used by Continental Baking Co., are effective tools of accident prevention. These posters should be changed every week.

Driver training should include the teaching and instruction of drivers' helpers and other employees who may have to be pressed into service as drivers when the shortage of experienced drivers become acute. This work should include actual instruction on the trucks.

Keeping a current record of accidents, complaints and traffic violations will also help in the driver training and indicate those men who need the most help in order to cut down accident expense. Some form of safety contest among the drivers, with or without safety awards, perhaps in the form of National Defense Bonds or Stamps, to tie in safe driving as a patriotic service, may bring good results.

Management itself can do much to promote safer driving—such as the slowing down of schedules to compensate for the increased wartime hazards and the scheduling of deliveries or pick-ups so as to avoid traffic peaks. And the scheduling of trucks should provide adequate time for mechanical inspection and repairs.

Many other employees besides truck drivers and helpers go to make up an efficient automotive transportation or delivery system and should be included in the company safety program. These include loaders and unloaders on docks or platforms, routers, clerks and even office workers. These employees may possibly form the reservoir from which new drivers and helpers may be drawn.

Safety meetings of the automotive men, either in large groups or in individual classifications, help to reduce accidents by keeping the need for safety always before these men. A sufficient number of bulletin boards with appropriate safety posters, changed once a week, also contributes to accident prevention.

Sending safety letters individually addressed to the homes of drivers aid the safety program, as do safety message cards included as stuffers in the men's pay envelopes.

All of the preceding suggestions have produced good results in previous safety work and may be utilized to good effect in the intensified efforts required under war conditions.

Effect of War on Baking Discussed at Meeting

Engineers make blackout recommendations. Cereal chemists report new technical information

PROBLEMS of operating bakeries and producing baked products under wartime conditions high-lighted the 19th annual meeting of American Society of Bakery Engineers at Chicago, March 9-12.

J. L. Schumaker, President of American Bakers' Association, emphasized the importance of experienced and coordinated management and production during wartime to meet the 10 to 15 percent increase in per capita consumption of bread, to contend with limitations placed on ingredient commodities, and to cooperate with the government in carrying the war effort through to victory.

T. O'Gorman, Armstrong Baking Co., Los Angeles, and Lee Hodgert, Model Bakery, Tacoma, Wash., reported on blackout practice and operation of bakeries under blackout conditions on the Pacific coast. Use of paint and shades or curtains was suggested for temporary blackout practice, with plywood, masonite, or fiberboard frames and special window and ventilator designs for permanent blackout installations. Protection against flying pieces of glass, shell fragments and fire was cited as being equally as important as protection against the direct force of a blast.

Blackout Paint

A paint suitable and economical for use in blackouts was reported to consist of:

Carbon black ground in oil	100 lb.
Paste dryer	50 lb.
Turpentine	2 gal.
Boiled linseed oil	½ gal.
Terebene	1 pt.

This will make about 10 gal. at a cost of $18 and give a coverage of 700 to 800 sq. yd.

A mixture to remove that paint was given, having the composition of:

Benzine	5 gal.
Acetone	3½ gal.
Paraffine wax	15 lb.

This will make approximately 10 gal.

Use of phosphorescent paint on protruding machine parts, floors, exit openings and fire-fighting equipment was recommended as an aid in clearing the plant and fighting fires during a blackout period.

In the course of its customary participation, the American Association of Cereal Chemists devoted half-a-day to the use of wheat germ and wheat-germ products in bread and to a report on the effect of water content of dough upon pounds of finished bread produced.

George Garnatz, Kroger Grocery and Baking Co., Cincinnati, reported results of tests run in three different bakeries in which bread was baked from dough made to contain water at standard absorption level and at 4 percent under and 4 percent over the standard level. Results showed that dough containing the highest of the three water contents produced the greatest poundage of finished bread. In the tests, 52 to 90 percent of the added water was recovered as bread, depending upon conditions in the individual bakery in which the test runs were made. Conversion of dry material to bread, resistance to staling and resistance to drying out increased with the increase of the three water contents used. Quality preference that gave no conclusive results.

Ways and means of minimizing the effects of restricted use of sugar were suggested. Among these suggestions were the use of concentrated fruit sirups, honey and malt-saccharified starch; substitution of corn flakes and malt flour or corn flour and malted wheat for sucrose; use of yeast diastase in cake batter carrying 21 percent sugar instead of the usual 29 percent; development and use of icings and fillings containing decreased sugar content, and use of a decreased icing or filling ratio.

AWARDS DEFENSE BONDS

National Biscuit Co., New York, awarded Defense Bonds as prizes in a recent sales contest, mailing them to 127 winning salesmen in practically every state in the union. The picture shows Urban A. Kreidler, sales manager of the company, buying $8,375 worth of Defense Bonds at the Federal Reserve Bank of New York.

ELECTED BY BAKERY ENGINEERS

Here are the newly elected officers of American Society of Bakery Engineers. From left to right, they are: F. J. Coughlin, Procter & Gamble Co., Ivorydale, Ohio, second vice-president; W. H. Geller, John R. Thompson Co., Chicago, first vice-president; William F. Gossadge, Grocers Baking Co., Louisville, Ky., president; and Victor E. Marx, Chicago, secretary-treasurer (reelected).

Canners Told To Reserve Part of Their '42 Packs

WPB names fruits and vegetables to be set aside for government and gives percentages and can sizes

WPB on March 13 issued orders confirming and revising the list of canned foods and the amounts which canners must set aside, from their 1942 packs, for the government. Instructions to this effect were embodied in Conservation Order M-86 and Supplementary Order M-86-a.

Within 30 days after the order was issued, canners of fruits and vegetables restricted by Tin Conservation Order M-81 (FOOD INDUSTRIES, March, page 65) must file with the Director of Industry Operations, WPB, Washington, D. C., a report showing the amounts packed in 1940. Those who packed these products in 1941 but not in 1940 must report 1941 production. Forms for such reports will be supplied to canners.

Within 15 days after completion of his 1942 pack, the canner is required to report 1942 production. During the 1942 canning season and immediately afterwards, the foods reserved for the government will be inventoried and inspected.

Tables I and II show, in order of preference, the grades and can sizes to be set aside. The canner is required to reserve the grade specified as the first preference to the extent that his total production of that grade is sufficient. Any deficiency of production in the first preferred grade shall be made up by the second preference. Should his production of these two grades be insufficient, the final balance shall be set aside from the third preference. Can sizes are also listed in order of preference.

Products listed in Table I are those not restricted in 1942 by Tin Conservation Order M-81. Those in Table II are the ones restricted. And here, the canners get a "break," because the amounts to be set aside for the government are in addition to the amounts that may be packed for civilian sale under Tin Conservation Order M-81. That is, if a canner packed 100,000 cases of beets in 1940, under M-81, he may pack 75,000 cases in 1942 for civilian use. Then, he may pack 60 percent of 75,000 cases to be set aside for the government, bringing his total to 120,000 cases.

Canners must set aside the pack reserved for the government for 60 days following the date of filing the report on the pack. At the end of the 60-day period, if the canner's pro rata share of canned foods has not been allotted, he may file appropriate notice with the Director of Industry Operations to the effect that such canned foods are being held for another 30 days and that if they have not been contracted for at the end of that time he intends to sell them to the civilian trade.

WPB Forms Corn Section

DOUGLAS C. TOWNSON, chief of the Food Supply Branch of the WPB, on March 13 announced the establishment of a Corn Products Section in the Food Supply Branch and the appointment of A. E. Staley, of Decatur, Ill., as Chief of that Section.

Britain Bans White Bread

THERE will be no more white bread on the tables of Britain for the duration, according to Lord Woolton, British Food Minister. A dark loaf made from a national whole meal will be substituted, because of the nation's

TABLE I—Unrestricted Products

The quota of any product listed in Column A to be set aside by any canner for the government will be equal to the percentage shown in column B applied to his total 1942 pack of that product.

A	B	C	D	E	F	G
Canned fruits and vegetables	Percentage of 1942 pack	Description	Can sizes preferred in order listed	Grade: First preference	Grade: Second preference	Grade: Third preference
Fruit Cocktail	23		10–2½–2	Choice	Fancy	
Peaches[2]	32	Clings—Freestone, Halves—Sliced.	10–2½–2	Choice	Std. Clings only.	Fancy
Pears	31	Bartlett halves	10–2½–2	Choice	Top Std.[1]	Standard
Asparagus	30	Culturally bleached, All Green.	10–2	Fancy cut	Fancy spear	
Beans, Lima	25	Fresh	10–2	Ext. Std.	Fancy green	Std. fresh white
Beans, String	28	Cut—Green, Wax, Round, Flat.	10–2	Ext. Std.	Top Std.[1]	Fancy
Corn, Sweet	23	Yellow, White, Cream style, whole kernel.	# 2 Cream style & whole kernel, # 10 whole kernel only.	Ext. Std.	Fancy	Standard
Peas	26	Alaska's 3 & 4 sieve, Sweets—3 & larger, ungraded.	10–2	Ext. Std.	Standard	Fancy
Tomatoes	33		10–2½–2	Ext. Std.	Standard	Fancy
Tomato Catsup	23		10–14 oz. Glass & larger.	Fancy 25% solids.	Standard	
Tomato Juice	15		10–3 cyl. (404 x 700).	Fancy.		

[1]Top Standard means 70–74 inclusive as defined in terms of U. S. Grades.
[2]Except Freestone Peaches packed in California. (See Table II.)

TABLE II—Restricted Products

The use of tinplate in packing these products is restricted by Tinplate Conservation Order M-81. The quota to be set aside for the government will be equal to the percentage shown in column B applied to the restricted production permitted by Order M-81 and such quotas may be packed in addition to the pack limitation set by said Order M-81.

A	B	C	D	E	F	G
Canned fruits and vegetables	Percentage as defined above	Description	Can sizes preferred in order listed	Grade: First preference	Grade: Second preference	Grade: Third preference
Apples	58	Heavy Pack	10	Standard.		
Applesauce	32	Fresh	10–2	Fancy	Standard.	
Apricots	50	Halves unpeeled	10–2½	Choice	Top Std.[1]	Fancy.
Cherries, RSP	21	Red Pitted (water pack)	10–2	Standard.		
Cherries, Sweet	34	Light Unpitted	10–2½–2	Choice	Top Std.[1]	Fancy.
Peaches	26	Freestone (Calif. only) halves—sliced.	10–2½–2	Choice	Fancy.	
Pineapple	26	Sliced—Crushed	10–2½–2	Fancy	Standard.	
Prunes, Fresh	25	Italian	10–2½	Choice	Fancy.	
Beets	60	Cut-Quartered-Sliced-(Diced)	10–2½–2	Fancy	Top Std.[2]	
Carrots	100	Diced	10–2½–2	Fancy	Top Std.[2]	
Pumpkin	65		2½	Fancy	Top Std.[2]	
Spinach	58		10–2½–2	Fancy	Top Std.[2]	

[1]Top Standard means 70–74 inclusive as defined in terms of U. S. Grades.
[2]Top Standard means 80–84 inclusive as defined in terms of U. S. Grades.

F. OLNEY BROWN

He was reelected president of National Pickle Packers Association. Mr. Brown is with Squire, Dingee Co., Chicago.

more vital need of the shipping space formerly reserved for white flour. After April 20, when the ban will go into effect, neither bakers nor manufacturers will be permitted to make anything of all white flour, or use more than 25 percent of white flour in any food product.

Package Problems To Be Discussed

Measures employed to overcome wartime difficulties to be told at conference April 14-17

MUCH NEEDED help in the solution of wartime packing problems will be received by those attending the Packaging Conference of American Management Association, to be held concurrently with the Packaging Exposition at the Hotel Astor, New York, April 14-17.

Departing radically from the traditional approach to packaging, packing and shipping problems, the conference program will center about measures successfully employed to align packaging activities with the war-created problems of existing and impending materials shortages. Major emphasis will be placed on "case stories" relating the experiences of a wide variety of companies.

An innovation of the program will be off-the-record intimate sessions at which there will be informal discussions with various authorities.

In connection with the Packaging Exposition held concurrently with the Packaging Conference, the Irwin B. Wolf trophy will be awarded to the package judged the best in regard to ten different desirable packaging characteristics.

Conserve important WAR materials

and SAVE 60% on your packing material costs

See this machine in action at the

PACKAGING EXPOSITION

Hotel Astor, New York, April 14-17

Booth 401

Now is the time to take advantage of the phenomenal savings made by machine-bundling—and here's the machine that may enable you to do it.

Because this model is adjustable for a wide range of sizes, it has proved ideal for bundling books in various quantities. It may likewise prove to be just the machine for your products. *Best of all, we can make delivery from our present stock.*

Produces a strong, protective bundle from Kraft or other wrapping material in roll form. End-labels with a special thermoplastic coating are also cut from material in roll form and firmly heat-sealed to both ends of the bundle. Will accommodate any bundle within the following size range:

	Length	*Width*	*Height*
Maximum	18″	8″	6″
Minimum	6″	3″	2″

Replacing expensive cardboard boxes, machine-bundling saves up to 60% on material costs. Since the machine requires only two operators, it makes a large saving on labor. And shipping costs are also reduced because bundles weigh so much less.

FOR CARTON WRAPPING, TOO —The BW-2 is also being used for wrapping cartons in heat-sealed transparent material. For this type of wrapping, end-labels are not necessary, but when used they make a considerable saving in wrapping material.

Write for further information

PACKAGE MACHINERY COMPANY, Springfield, Massachusetts

NEW YORK CHICAGO CLEVELAND LOS ANGELES TORONTO

PACKAGE MACHINERY COMPANY

Over a Quarter Billion Packages per day are wrapped on our Machines

Egg Driers Get Helpful Advice

Faulty practices are cited and constructive suggestions made. British want retail packages

DELIVERY OF 160,000,000 lb. of dried eggs for Lease-Lend by January 1 is the goal of Surplus Marketing Administration announced by W. D. Termohlen at the Dried Egg School held in Kansas City, Mo., on February 28.

Of that quantity, the British want at least 44,800,000 lb. packaged in 5-oz. units (equivalent to a dozen eggs) for retail marketing.

Mr. Termohlen put the existing dried-egg production capacity at approximately 250,000,000 lb., spread among about 80 plants throughout the U. S. A.

Facilities for filling the packages on a production basis appear to be zero. Since dried eggs will not feed by gravity, fillers employing augers have to be built. Proposal is made to have the packaging done at from two to four central packaging points and to impose rigid specifications of quality upon the eggs going into the packages.

In the course of the Dried Egg School, sponsored by SMA and National Egg Products Association, C. E. Sidler, SMA field man, reported on conditions in the industry. He emphasized the need for (1) correcting amateur incompetency, (2) encouraging good technic in production and sanitation, and (3) acquainting the newcomers in the industry with government procurement procedure.

He stressed the necessity of using refrigeration to keep the eggs cool prior to and during breaking and of having vat capacity to hold the eggs at a low, but not freezing, temperature between the breaking and drying operations.

CONTENTS
1 LB. 4 OZ.
Brand NAME
SMALL SIZE GREEN
Lima Beans
PRODUCT LIMA BEANS SEASONING SALT
COLOR GREEN CAN SIZE No. 2
SIZE SMALL SERVINGS
QUANTITY APPROX. 2½ CUPS
4 TO 5
SMALL SIZE
GREEN LIMA
BEANS
YOUR OWN DESCRIPTION OF RAW PRODUCT AND METHOD OF PROCESSING—MUST BE HONEST, FACTUAL, BRIEF, UNPUFFED.
HOW TO PREPARE
Pour liquid into a sauce pan. Boil down to about one-half. This saves flavor and food values. Add beans. Heat only a few minutes. Add butter, salt and pepper to taste.
BRAND NAME
SMALL SIZE GREEN
Lima Beans
CONTENTS 1 LB. 4 OZ.
DISTRIBUTED BY
FIRM NAME
CITY AND
STATE

MODEL DESCRIPTIVE LABEL

This is one of several descriptive labels prepared by the labeling committee of National Canners Association to show how a good label of this type is designed and what information it carries. The label was designed with consumer convenience in view. Essential information may be readily found and easily read.

With regard to breaking and handling equipment he reported fairly satisfactory conditions, although some rusty egg cups and buckets, considerable black pipe and exposed copper in vats and coils, exposed iron in drying chambers, and a number of bronze pump heads and centrifugal pumps were observed to be in use.

Recommendations were made for wider and better use of sterilizing apparatus, air filters and ventilators, particularly in the egg candling and breaking departments.

Dr. H. E. Gorseline, Bureau of Agricultural Chemistry and Engineering, reported on the work he has been doing at egg breaking and drying plants with his mobile laboratory.

Employee instruction as to the whys and wherefores of the operations performed, locker room and personnel sanitation, washing of dirty eggs before breaking, instructive supervision, and precision instrument control over drying conditions were stressed as being highly important.

Putting together of nondescript material and units to build a make-shift drying plant and the hit-or-miss procedure of drying eggs were singled out by W. D. Termohlen as being contrary to the policy of the SMA. And it was indicated that purchasing of eggs from such plants would be avoided.

Food Sent to Greece

FINAL arrangements for the first shipment of food from the United States to enemy-occupied territory in Europe since early last year were completed in mid-March. A formal announcement from the State Department disclosed that the U. S. and Britain had agreed to ship a 2,500-ton shipload of flour to Greece after satisfactory assurances were forthcoming from the Axis. In addition, it was planned to permit Greece to purchase some foods in Switzerland, using funds frozen in the U. S.

How Metso Cleaners Prevent Waste
SPARE THE SURFACE
Aluminum, tin and other costly metal equipment in your plant needs more careful handling than ever before. You can conveniently stretch its life by cleaning with Metso.
Metso removes all grease, oil and accumulated dirt, and then rinses free, leaving a bright and sparkling surface. A large Western creamery is mighty proud of its aluminum alloy cans after 3 years of Metso cleaning.
Ask for Metso. Its unique component, called soluble silica, restrains corrosive or etching action. A Metso distributor is near your plant. Name on request.
Sodium Metasilicate U. S. Pat. 1898707
PHILADELPHIA QUARTZ CO.
125 S. Third Street, Philadelphia, Pa.
Chicago Sales Off.: 205 W. Wacker Dr.
Sold in Canada by Nat. Silicates, Ltd.
Distributors Stocks in over 60 cities.
METSO
METSO CLEANERS

SMA Finances Dry Milk Plants

Will be built and operated by Land O' Lakes. Total capacity to be 45,000 lb. a day.

SURPLUS MARKETING ADMINISTRATION in March announced allocation of Lease-Lend funds for three large skim-milk drying plants to be built and operated by Land O' Lakes cooperative creameries in Wisconsin and Minnesota for government account. The total capacity of the plants will be nearly 45,000 lb. daily.

The financing arrangements for dry skim plants—more of which are expected—follow the pattern established during the winter for several cheese and evaporation plants. Cooperatives borrow from the Bank for Cooperatives, build the plant, give title to SMA to get funds to pay off the loan and then operate the plant for SMA, paying a rental which may ultimately "buy" the establishment.

The three dry skim plants are to be at Litchfield and Milacha, Minn., and Whitehall, Wis. They will be supplied from the Land O' Lakes creameries in each area, which are being equipped to separate whole milk instead of accepting only cream deliveries. By this procedure, SMA hopes to get the added dry skim facilities needed without an inordinate expansion in butter production.

Private financing of similar facilities also can obtain SMA assistance both in getting needed priorities and in obtaining certification of necessity to permit amortization of the plant in tax returns over five years.

SCHEDULE OF EVENTS

APRIL

14–16—Pacific Northwest Bakers Association, Multnomah Hotel, Portland, Ore.
14–17—Packaging Exposition, Hotel Astor, New York, N. Y.
20–24—American Chemical Society, Memphis, Tenn.
23–24—American Dry Milk Institute, Edgewater Beach Hotel, Chicago, Ill.
30–May 1—American Oil Chemists Society, annual meeting, Houston, Tex.
30–May 1—Millers' National Federation, Edgewater Beach Hotel, Chicago, Ill.

MAY

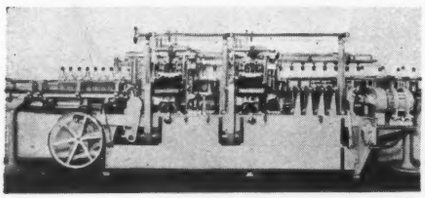
3– 6—Southern Bakers Association, annual convention, Biltmore Hotel, Atlanta, Ga.
18–20—Flavoring Extract Manufacturers Association of the United States, Hotel Pennsylvania, New York, N. Y.
18–22—American Association of Cereal Chemists, annual meeting, Edgewater Beach Hotel, Chicago, Ill.
21–23—Rice Millers' Association, Arlington Hotel, Hot Springs, Ark.
26–28—Biscuit and Cracker Manufacturers Association, Chicago, Ill.

LUNKENHEIMER VALVES
Are Helping to Build Tanks

ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO
BOSTON PHILADELPHIA
EXPORT DEPT. 318-322 HUDSON ST., NEW YORK

28-92C-11

WORLD'S FINEST LABELERS

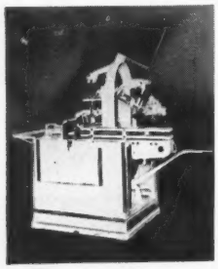


The WORLD Automatic *BEE-LINE* Straightaway

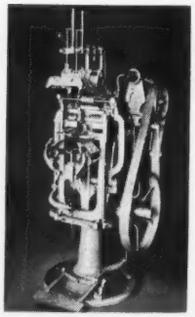
is for smooth, swift, precise full automatic application of front or front and back body labels—and neck labels simultaneously if desired—to round, square, flat, oval or panel bottles or flasks. It conducts each container gently, surely and steadily through the entire operation in a bee-line, without stops, detours or collisions. It is ideal for the new light weight glass.

The WORLD Automatic UNI-TURRET Labeler

for high quality, low cost, full automatic labeling of smooth, fluted or fancy containers. It is equipped with patented sliding picker mechanism for gumming entire label surface or any portion of it, as desired. The new turret construction makes for unusual compactness, simplicity and economy as well as high efficiency.



The WORLD Model S Semi-Automatic Labeler



is World's most flexible labeler. It labels any size bottle from tiny samples to gallon jugs. It applies front and back labels, body, neck labels, or labels that go all 'round the bottle.

"You Get the Best Labeling In The WORLD"

ECONOMIC MACHINERY CO.

WORCESTER, MASSACHUSETTS

Idle Food Plants Urged To Convert to War Work

Plants with machines available should write to WPB for instructions. All facilities to be utilized

CANNING PLANTS that have been hampered in their operations or made idle by the tin order or closed for any other reason have been urged to get into war work. The Food Supply Branch of WPB late in March asked that any canner so affected write for the food plant conversion form. The Food Supply Branch is prepared to study the case of each plant and make suggestions for its conversion or other use in the war effort. This is in line with the policy of WPB to put every available machine to work and to get as much production from each plant and machine as possible.

While this appeal was addressed to the canners, it is equally applicable to all other food processors.

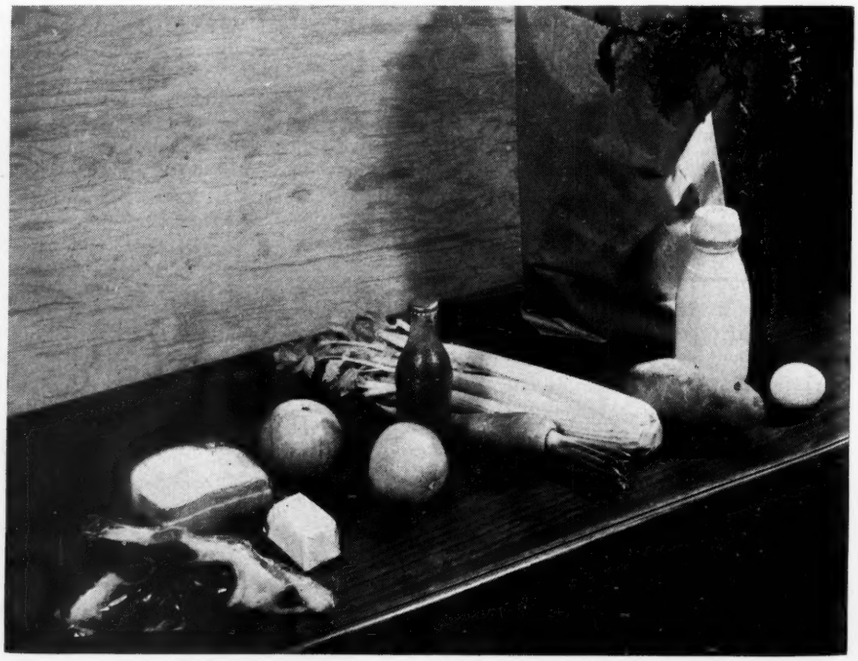
Ice Cream Hearing Nears Completion

THE ICE CREAM industry and ingredient suppliers have completed their testimony at the ice cream standards hearing, and a recess has been taken until April 9. At that time the government will present its rebuttal of the industry arguments. It is expected that this final session of the hearing will last not more than a week or ten days.

The principal subjects of discussion at the hearing up to the time of its March 10 recess were butterfat content, use of neutralizers in the making of these frozen dairy products, the use and labeling of vanilla and vanillin, and ice milks.

In general, the case presented by the industry was probably the most carefully prepared and most elaborate of any of the food standards hearings to date. The length of the record at the time of the recess (just under 5,000 pages) speaks for itself. As usual, arguments developed over the inclusion of various bits of evidence, but on the whole the hearing record should be a more than adequate base for satisfactory standards of identity.

Consumer testimony was conspicuous by its scarcity, continuing the trend noticed over the series of hearings since 1939. As one observer has put it, the consumer rarely knows what he wants. When the difficulty of determining



CURE FOR HIDDEN HUNGER

These foods, representing a daily balanced diet for good health, are shown in a scene of the film "Hidden Hunger." Made in Hollywood and financed by Swift & Co., this film will be presented in theaters throughout the country by Federal Security Agency as part of the National Nutrition Program. It is an entertaining picture showing the adventures of farmer Link Squires (played by Walter Brennan), who runs into trouble while agitating for better nutrition.

what he gets is added to that uncertainty, the "need for standards is most apparent."

Nutrition Group Launches Career

Foundation will promote five-year research program for the public benefit. Officers named

Nutrition Foundation, Inc., began its public career with an inaugural dinner at the Waldorf-Astoria in New York on March 12, 1942. Fifteen corporations have pledged $10,000 a year for five years "to aid in the discovery of scientific facts regarding nutrition, and to aid in making these facts available to the public which eats food, in such a manner that the diet of the American people may be improved as much as possible in the directions indicated by soundly established scientific findings." It is expected that other founding or contributing companies will join the foundation. To date, $800,000 has been subscribed.

The officers of the Nutrition Foundation are:

Chairman of the board, Dr. Karl T. Compton, president of Massachusetts Institute of Technology; president, George A. Sloan, of New York; scientific director in charge of research, Dr. Charles Glen King, University of Pittsburgh; executive secretary, Ole Salthe, New York.

The Scientific Advisory Committee includes:

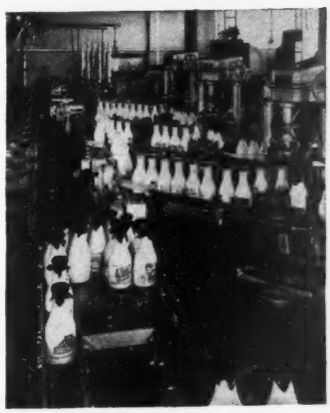
Drs. H. C. Sherman, E. V. McCollum, C. A. Elvehjem, L. A. Maynard, F. F. Tisdale, W. H. Sebrell, W. C. Rose, R. C. Newton, Lydia J. Roberts, J. R. Murlin, Icie Macy Hoobler, R. R. Williams, F. G. Boudreau and Col. Paul E. Howe.

The Food Industries Advisory Committee comprises:

Dr. Roger Adams, University of Illinois, representing Coca Cola Co.; H. A. Barnby, Owens-Illinois Glass Co.; Dr. F. C. Blanck, H. J. Heinz Co.; Dr. C. N. Frey, Standard Brands, Inc.; F. L. Gunderson, Committee on Food and Nutrition, National Research Council; Dr. W. H. Harrison, Continental Can Co.; N. F. Kennedy, Corn Industries Research Foundation, Dr. F. Kohman, Campbell Soup Co.; Donald Maveety, National Biscuit Co.; Dr. R. W. Pilcher, American Can Co.; Dr. G. L. Poland, United Fruit Co.; A. C. Richardson and James McConkie, California Packing Corp.; Dr. H. E. Robinson, Swift & Co.; Dr. J. A. Tobey, American Institute of Baking and Lewis W. Waters, General Foods Corp.

Why Milk Prevents Lead Poisoning

A RECENT editorial in the *Journal of the American Medical Association* shows that the level of calcium in the diet influences the amount of lead that may be absorbed from the digestive tract. As milk is the only reliable source of calcium in the diet, it has a direct influence in protecting the body from absorption and assimilation of these small amounts of lead.



Photos courtesy, Cherry-Burrell Corp., Chicago, Ill.

Here is an effective illustration of how one manufacturer found the answer to his material shortage problem. This conveyor belt for moving milk bottles from washer to filler was formerly made of brass. Brass is not available now and a substitution was necessary.

Jessop SILVER-PLY Stainless-Clad Steel was tested and found to have the required non-tarnishing and corrosion resisting properties, and—at the same time held material costs down to a reasonable figure.

If you, too, are seeking replacement materials for use in processing, handling and storage equipment consider now Jessop SILVER-PLY Stainless-Clad Steel. Write for free literature.

Manufactured under U. S. Patent Nos. 1,997,538 and 2,044,742

JESSOP STEEL COMPANY
General Offices
WASHINGTON, PENN., U. S. A.

JESSOP STEELS FOR AMERICA AND HER ALLIES

CARBON · HIGH SPEED · SPECIAL ALLOY · STAINLESS · COMPOSITE STEELS

Will Develop New Dehydrater

Canners and WPB form committee and engage expert to experiment with two types of driers

STEPS are being taken to develop a dehydrater specially suited to use by canners and other food manufacturers whose operations may be curtailed because of the tin conservation order or other restrictions.

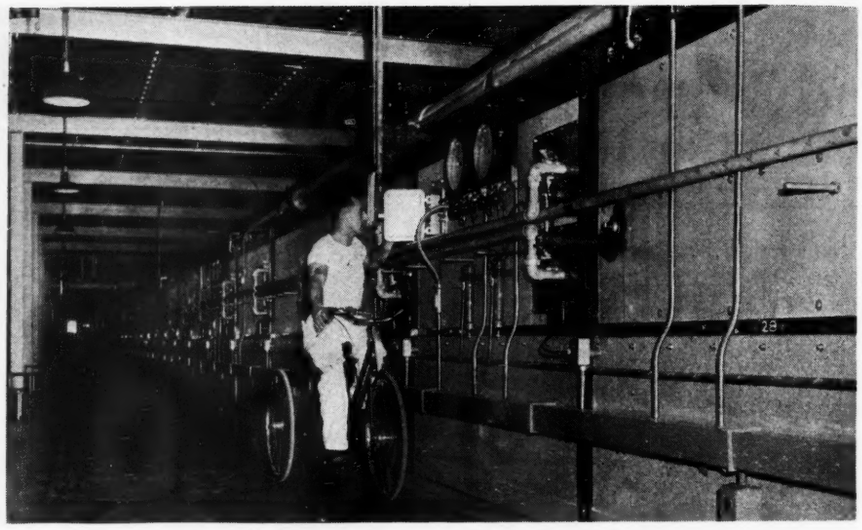
John L. Baxter, of the WPB Food Supply Branch, invited representatives of Standard Brands, Inc., Snider Packing Corp., Curtice Brothers Co. and H. C. Baxter & Brother to meet in Washington on March 4 to discuss the possibilities of developing such a drier.

At this meeting Mr. Baxter outlined the importance of giving serious consideration to the dehydration of vegetables, especially at this time when the tin situation is most acute. He stated that in his opinion, a dehydrating unit could be built at a very reasonable figure and yet produce an acceptable product for military and civilian use.

A committee organized at the meeting agreed to employ A. A. Noel, who will take leave of absence from the Department of Agriculture, to supervise the building of two types of dehydraters and conduct experiments. Mr. Noel participated in similar experiments during the last war and he has been experimenting with the dehydration of meat.

If the experiments are successful, their results will be made available, including technical data and blueprints, to anyone interested.

The committee which made the arrangements consists of F. Webster Browne, H. C. Baxter & Brother; H. J. Humphrey, Snider Packing Corp.; W. S. Macklen of Curtice Bros. Co.; and W. L. Finger of Standard Brands, Inc.



TRICYCLE QUALITY CONTROL

Inspectors would have to walk the equivalent of the distance around a city block to check the instruments on the battery of ovens in the Oakland, Calif., plant of Loose-Wiles Biscuit Co. So the tour is made via tricycle. This battery of ovens is said to be the world's largest.

CONSERVE FOR VICTORY

Improve Cleaning Practice

MIKRO SAN

"The Original Acid Cleaner"

For washing and sterilizing milk cans and metal food containers—also for general plant cleaning.

MIKRO SAN will give a surface degreased, free from any adherent film and with no possibility of milkstone, lime or other material depositing or redepositing on the surface. It also has an inhibiting effect which will prevent the growth of destructive micro-organisms that ruin quality. MIKRO SAN is non-corrosive in character, it does a better job for less money.

Manufactured and Sold by

THE REX CO.

DIVISION OF P. W. BONEWITZ CHEMICAL COMPANY

BURLINGTON, IOWA

Saves

- containers and tin
- steam and fuel
- storage and freight car space
- dairy metals and equipment
- time and labor
- scarce and essential chemicals

•

Write today for bulletin that gives you the complete facts — get the benefits of MIKRO SAN at once.

Price Ceilings Put on Pork and Canned Food

FURTHER moves to stabilize food costs to consumers were made by OPA last month. A price ceiling was put on canned fruits and vegetables at the level prevailing from February 23 to 27, 1942 (Temporary Maximum Price Regulation No. 6). And a ceiling was also put on some 90 percent of pork products, at the level of March 3 to 7 (Temporary Maximum Price Regulation No. 8).

It has also been announced by OPA that 200 manufacturers of kraft converting papers, coarse sulphite papers and tissue papers were asked not to exceed prices of October 1 to 15, 1941.

OPA also set maximum prices for egg cases at the level of February 17 to 21, 1942.

U. S. D. A. Streamlined For More Efficiency

COMPLETE reorganization of the Department of Agriculture, as ordered by the President, radically shifts the lines of authority. All of the research bureaus are now grouped together in the Agricultural Research Administration, which is directed by Dr. Eugene C. Auchter, former director of the Bureau of Plant Industry. Grouped in the

ARA are also the Bureau of Dairy Industry, the Bureau of Plant Industry, the Bureau of Home Economics, the Bureau of Agricultural Chemistry and Engineering, the Bureau of Entomology and Plant Quarantine, the Beltsville Research Center and the Office of Experiment Stations.

The immediate advantage of the new group is illustrated by the program of committee work on meat dehydration. That program must be speeded to assist in getting for Lease-Lend the maximum production of dehydrated meat for our allies. The new committee is under the chairmanship of Dr. J. R. Mohler, who has been director of the Bureau of Animal Industry. On the committee are representatives of BDI, BPI, BHE, and BACE. Thus, quick cooperation can be achieved at this administrative level without awaiting review by the Secretary of Agriculture or other high authority.

Similar consolidation has been made of the old Surplus Marketing Administration, Agricultural Marketing Service and other related bureaus into a new Agricultural Marketing Administration, which will direct all the utilization problems of agriculture, both domestic and in foreign trade.

ANSWERS TO FOOD LAW QUESTIONS

Interpretative Opinions from F&DA Letters to the Industry

Two items in recent trade correspondence of the Food and Drug Administration are of interest to food manufacturers. These are abstracted below, continuing the series of "Answers," last printed on page 71 of the February, 1942, issue of FOOD INDUSTRIES.

ABSTRACTS

231. In the labeling of any *wheat germ oil* or products represented as having *vitamin E* activity offered for human use, consideration must be given to section 201(n) of the Food, Drug and Cosmetic Act and the regulations thereunder, and to the dietary food labeling regulations, published in the *Federal Register*, Nov. 22, 1941.

232. Wartime restrictions on *sugar* have prompted requests for permission to substitute *saccharin* for sugar in foods. However, saccharin has no food value, and it is several hundred times as sweet as sugar. The substitution of saccharin, even in minute amounts, for sugar, displaces relatively large amounts of sugar and materially reduces the food value of a food to which saccharin is added. The Food and Drug Administration holds that foods containing saccharin in any proportion are adulterated, unless they are for special dietary uses and comply with dietary food labeling regulations, published in the *Federal Register*, Nov. 22, 1941.

IN FLOUR MILL buildings of all types, housing from one to three milling units of widely-varying capacities and utilizing equipment made by many different manufacturers, the MACHINERY PIPING SYSTEM (MPS), plus liquid hydrocyanic acid (HCN) applied by Industrial Fumigation Engineers (IFE), "adds up" to economical, rapid, practically 100% extermination of insect pests in all stages of their life cycles.

The MACHINERY PIPING SYSTEM is POSITIVE. It was developed to utilize most effectively, yet safely, one of the most potent fumigants. Liquid HCN is high-pressured throughout an all-inclusive system of copper tubing, bronze fittings and bronze, dustproof nozzles. Thus, heavy concentrations of gas penetrate ALMOST INSTANTANEOUSLY into every part of the milling equipment. The effectiveness of the method obviates extensive clean-up.

A competent Industrial Fumigation Engineer will be glad to survey your mill and determine the cost "per barrel of yearly production" for an ADEQUATE FUMIGATION PROGRAM.

The production capacity now being served by the FLOUR MILL MACHINERY PIPING SYSTEM already totals more than 75,000 barrels of flour per day. The list, which includes some of the industry's finest and largest mills, is available to interested mill executives.

Economical and adequate control of insect pests in any mill can best be maintained by fumigation of *all* its equipment at *the same time*.

American Cyanamid & Chemical Corporation
A Unit of American Cyanamid Company
INSECTICIDE DEPARTMENT
30-D ROCKEFELLER PLAZA • NEW YORK, N. Y.
KANSAS CITY, MO. • AZUSA, CALIF.

STOP THOSE MULTIPLYING WONDERS — GRAIN BEETLES!

They're fast multipliers—hatching in as little as 4 days, from an average of about 136 eggs per female. They are a costly nuisance and source of damage in food processing plants for they thrive on various breakfast foods, grains, starch, flour, dried fruits, spices, etc. Unless controlled they can be the cause for complaints, returned goods and loss of consumer good will.

Control pests by thorough fumigation with properly applied HCN gas. Call on your local Pest Control Operator. Talk over your pest problem with him and let him show you his plans for effective control. You will find that a well planned fumigation program carried out by expert and experienced Pest Control Operators may save you future expense and worry that will make it worth many times its original cost.

DU PONT

E. I. DU PONT DE NEMOURS & CO.
INCORPORATED
THE R. & H. CHEMICALS DEPARTMENT
WILMINGTON • DELAWARE

CYANEGG
AN ECONOMICAL SOURCE OF HCN FUMIGATING GAS

Conservation Order For Tin Modified

WPB last month made various modifications in Tin Conservation Order M-81 (FOOD INDUSTRIES, March, page 65). The restrictions were eased to permit the manufacture and sale of cans necessary for packing certain secondary products (Table II of M-81) which were planted before February 11 and for which a canner had contracted by that date. And provisions of the order which place quantity limitations on the packing of such vegetables have been lifted until May 31 in order to reduce spoilage.

Another modification permits can manufacturers to assemble and sell tin cans of restricted sizes which were manufactured on or before February 11.

A third modification gives permission to tin can manufacturers to deliver until May 31 cans for packing beer, coffee and hams, which were completely manufactured on or before February 11.

CAPITAL VIEWS

IDLE EQUIPMENT—Any firm that has food processing equipment which is idle has a patriotic responsibility to put it to work during the coming season. If available supplies of raw material to be processed will not be adequate, then arrangement should be made for somebody else to use this machinery. We are going to be so short of processing capacity that idle equipment will mean unnecessary spoilage of something, it now appears.

STORAGE SPACE—Prearrangement for storage of peak supplies of raw material should be made. Equally obvious, but often neglected, is the prospective need for more than normal storage space for food products. Many of these goods are going to pile up at or near the point of packing during the peak of the coming season. Frequently they cannot move to market through normal channels. The government may become the customer, but the government is not always ready to take the output promptly because of its tremendous and complicated job. Each local management should, therefore, plan now for product storage certain to be sufficient to carry over any period of delay in shipment.

MORE DEHYDRATION!—Government officials are arguing that every canner and freezer must get ready to use every available means for fruit and vegetable drying this coming season. The argument is that peak crops are to be expected and adequate container supply is very doubtful. Canners must use their facilities to a maximum for vegetable preparation for drying when the can, bottle or jar supply runs out. If this is not done, there will be much spoilage, and much criticism of the processor.

A PRACTICAL THEORY—Many food processors have regarded the government's program of container simplification as an academic and theoretical matter. Now it is evident how very practical, and how very important it is. Anyone not acquainted with the simplification of sizes and types of containers for his own industry should promptly become acquainted with the National Bureau of Standards "Simplified Practice" methods and programs. These can be applied to many things not previously affected. For economy in packaging materials it may be necessary to do so, even to the serious inconvenience of the food processor. Early acquaintance with the problem may save much grief later.

DAMNED BY RESEMBLANCE—Under normal application of the Food and Drug law, a product is considered adulterated if it is close in appearance and general characteristic to a standardized product, but does not exactly comply with the standard. Mere labeling to show that it is not a standard product does not exempt it from criticism. With shortage of raw materials and difficulties of processing which develop suddenly during wartime, this regulation may occasionally cause serious difficulty. Processors who can anticipate such trouble will do well to take up their difficulties with the Food and Drug Administration in advance. If they explain the cause of variation from standard, and demonstrate that they are doing the best they can to meet the law and to serve their customers, it is to be hoped (and expected) that F&DA officials will be cooperative. But any attempt to get by without frankness with the government may not be so favorably regarded.

FAT SAVING—Any food industry which can contribute reclaimed or byproduct fat for use of the soap man will be wise to do so. The soap industry must make very large quantities of glycerin for war purposes. This means that even a scarcity of fats will not be allowed too casually to interfere with generous soap making lest the glycerin supply be unduly curtailed. If present fat wastes can be diverted to soap making by food processors, this may prevent the taking of more food fat for the soap kettle. Thus both the food industries and the general public will be better served.

PRICE "SQUEEZE"—Food processors are likely to be pinched more than ever by two important official policies. There is an intense desire to keep down the retail price of all foods, for general public benefit. There is an equally intense desire, politically inspired, to allow agricultural raw material prices to rise as much as possible. The fact that this pinches off profit opportunity for both distributors and processors has little influence on the thinking of political-minded officials. No opportunity should be lost to demonstrate the danger of the present trends in this regard.

WPB Orders Affect Food Industries

WPB issued a number of orders last month which affect the food industries. In an amendment to Order M-19 the use of chlorine in bleaching foodstuffs was prohibited.

Order M-107 will have the effect of increasing the production of cotton bags for agricultural and chemical products. It assigns a high priority rating (A-2) to orders for the fabrics required for the bags.

A third amendment to the burlap order (M-47) makes additional quantities of burlap bags available for peanut seed and seed potatoes.

The Containers Branch of WPB clarified the modified regulations governing the shipping of freight in corrugated and solid fiber containers by an explanation that the minimum requirements had been reduced.

Canned Fruit Standard Issued by the F&DA

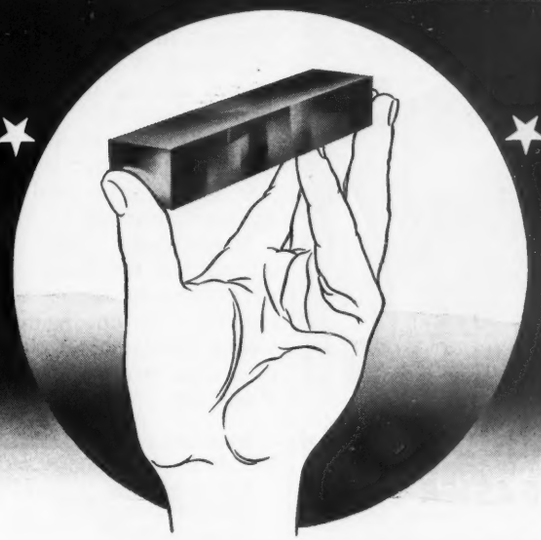
F&DA issued the final order on the standard for canned fruits early last month, and it was published in the *Federal Register* of March 3. The final standard differs only in minor detail from the preliminary order issued in January.

Action on the canned fruit cocktail docket is expected at any time. This was presumably held up by the sweetener problem until after the final canned fruit order was issued. There was also the difficulty of drawing up a standard on the basis of the limited record.

It is possible that the Administrator will decide that no standard is justified on the basis of the record. Or he may reopen the hearing to obtain further evidence. Some feel that a standard based upon the present record alone would be inadequate.

"They're our official tasters."

A block of STEEL



needs HEALTHY MEN

to fashion it into

SINEWS of WAR

Fashion it into an implement that will do good for our men wherever they may be fighting.

Vilter is devoting a large portion of its production to these implements of victory, and that's one responsibility.

We have another responsibility — protecting through refrigeration the milk and meat, fruits and vegetables, so that capable men all over the country will have the health and the stamina to fashion blocks of steel into the actual sinews of war.

Vilter wants you, who are a part of the health and morale industry of this nation to know that we have the men and the facilities to supply you with the refrigeration equipment you need for the maintenance of your part of America's war effort.

It is said, 19 men are needed to support one man at the front. These 19 have to be fed, clothed and equipped. In addition to our direct aid to that soldier, we are able to help you feed the 19 back home who are supporting him.

Superior Since 1867
VILTER
Air Conditioning
Refrigeration...

The VILTER MFG. COMPANY
2115 South First Street MILWAUKEE, WISCONSIN
Offices in Principal Cities

SEAMLESS STEEL CONTAINERS

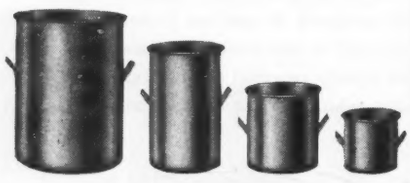
MAKE HANDLING *and* STORING *EASIER-SAFER*

Hackney Seamless Steel Containers are being used by manufacturers of food products for their handling and storing requirements. They are proving their advantages over ordinary containers . . . in interior departmental handling of raw products during manufacturing processes . . . in storage of materials . . . throughout the food plant.

Hackney Seamless Steel containers are cold-drawn to shape—not a weld or joint in their entire construction. A wearing ring provides the bottom with adequate reinforcement. As a result, these Hackney containers provide the maximum in long life, appearance, and cleanability.

AVAILABLE IN ALL POPULAR SIZES

Hackney Seamless Steel Containers can be furnished in all popular sizes—five to sixty gallon capacity, galvanized, tinned, or black. Why not see how your plant can benefit from these Hackney Steel container advantages? Write today—there is no obligation.



Hackney

PRESSED STEEL TANK COMPANY

1349 Vanderbilt Concourse Bldg., New York
208 S. La Salle St., Room 1573, Chicago
669 Roosevelt Building, Los Angeles
1457 S. 66th Street, Milwaukee

Containers for Gases, Liquids and Solids

Foods Are One-Third Of Lease-Lend Total

FOODSTUFFS represent just over one-third of the shipments made under the Lease-Lend program in the first year of its operation, the President reported to Congress in March. The report listed 34 percent of shipments as foods, 29 percent military items and 37 percent industrial materials. Also disclosed was an unretarded monthly increase in Lease-Lend aid, to a level of $569,000,000 in February and a cumulative 12-month total of $2,570,000,000.

Exact dollar value of foodstuffs shipped was not listed—the reports always lump foods and industrial commodities into one figure, but the following tabulation of the bulk volume of several items was reported by the President.

Meat and fish	814,756,776 lb.
Milk products	663,718,086 lb.
Egg products	128,652,685 lb.
Fruits and vegetables	814,006,538 lb.
Grain and cereals	1,018,659,578 lb.
Sugar and related products	22,932,331 lb.

The report notes that shipments of foods under Lease-Lend to Russia is now sharply increasing, mostly wheat, flour and sugar which would have come from the Ukraine normally. In addition to Russia and Britain, however, food shipments are going in considerable quantities to the Middle East—where milk, fish, bacon, cheese and vegetables all must be canned.

Coffee Will Be Shipped

ORDERS recalling Brazilian vessels—carrying coffee and cocoa cargoes—to home ports, and cessation of further sailings of Brazilian ships, should not be taken as materially hampering the flow of these commodities from that country, it was announced on March 12 by the Office of Price Administration and the Civilian Supply and Food Supply Branches of the War Production Board.

Vegetable Trend Is Up

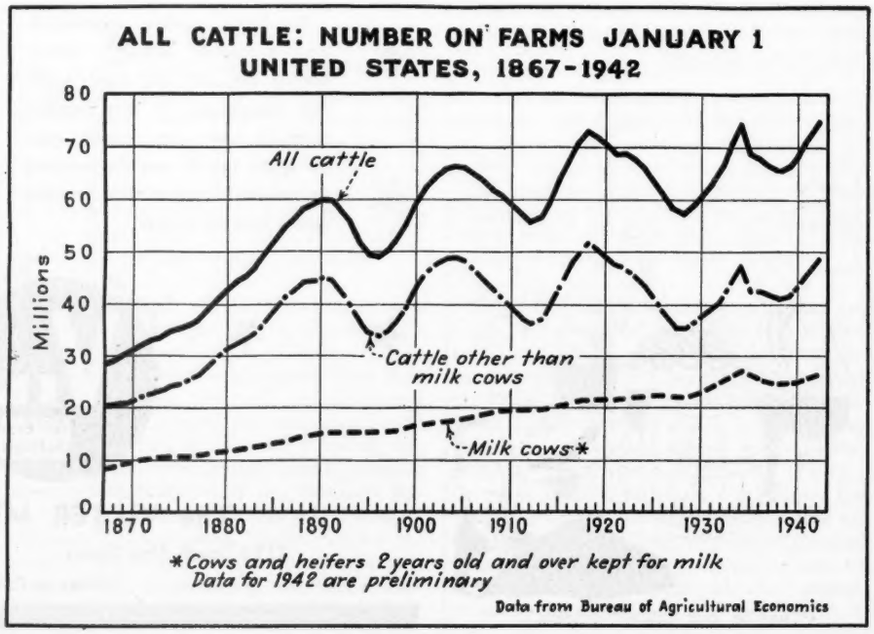
STATISTICS recently compiled by the U. S. Department of Agriculture show greatly increased production and consumption of vegetable products in the United States. The table below gives comparisons for vegetable consumption in 1921 and 1941:

Vegetable	1921	1941
Lettuce	7,214,000 crates	23,388,000 crates
Spinach	76,900 tons	143,277 tons
Carrots	6,250,000 bu. ('27)	17,747,000 bu.
Snapbeans	81,050 tons	348,705 tons
Green peas	128,500 tons	466,835 tons
Tomatoes	726,900 tons	3,374,600 tons
Cabbage	689,500 tons	1,273,300 tons

Prices Still Increase

IN SPITE of price ceilings and other government efforts to hold prices steady, commodity prices moved upward somewhat during the month from February 14 to March 14. The *New York Journal of Commerce's* weekly index of commodity prices, at 100.4 on the earlier date, advanced to 101.1 at the end of the period. In the same weeks, that publication's index for grains fell from 95.4 to 94.6, while its index for food commodity prices rose from 98.4 to 99.5. According to the U. S. Department of Labor, retail prices of foods have shown only slight increase in recent weeks, but wholesale food prices advanced from an index of 93.7 on February 7 to 95.8 on March 7.

Spot prices of foods showed less va-



riation than usual during the period from February 14 to March 14. Wheat, No. 2 hard winter, Kansas City, fell from $1.21¼ to $1.20¾. Corn, No. 3 yellow, Chicago, was steady at 82½c. Flour decreased from $6.60 to $6.45. Beef fell from 19½c. to 19c; and lamb fell from 18½c. to 17½c., but pork loins increased from 23c. to 25c. Lard also increased, from $12.35 to $12.60. Eggs decreased from 29¾c. to 29¼c., butter was stationary at 34¾c., and cheese declined from 26¼c. to 25¼c. Coffee and sugar were stationary, under their ceilings, but cocoa increased from $8.90 to $9.10. Tomatoes alone, among important canned foods, increased, moving from $1.05 to $1.10.

CONSTRUCTION NEWS

	Pending (thousands)	Awarded March (thousands)	Total Awarded 1942 (thousands)
Bakery	.....	$50	$50
Beverages	.....	195	927
Canning and Preserving	$155	43	83
Cold Storage Plants	80	40	215
Confectionery	.....	.....	.....
Grain Mill Products	355	.....	105
Ice Manufactured	.....	100	140
Meats and Meat-Products	200	.....	143
Milk Products	530	89	742
Miscellaneous	2,250	506	1,751
	$3,570	$1,023	$4,156

INDICATORS

Cocoa receipts in the United States this year, up to mid-March, totaled 341,000 bags. In the corresponding period of 1940, cocoa receipts were 1,051,091 bags. Cocoa stocks in the U. S. on December 31, 1941, were 4,224,000 bags, compared to 4,113,000 bags one year before.

Flour output in February, 1942, by mills accounting for 65 percent of United States production, was reported by *The Northwestern Miller* at 5,557,076 bbl., compared to 5,351,675 bbl. reported for the same mills in February, 1941.

Wheat carry-over, July 1, 1942, is forecast at about 630,000,000 bu., compared to an actual carry-over of 385,000,000 bu. on July 1, 1941. Stocks of wheat on January 1, 1942, were estimated at 988,000,000 bushels.

Wheat, durum, in stock on January 1, 1942, was 52,900,000 bu., a record figure.

Fishery products landings in Boston so far this year have been running but little more than half the production reported for the same period of 1941, but prices, which averaged $3.73 per 100 lb. in 1941, increased to $7.59 per 100 lb. in February this year.

Lard yield per hog this year is running close to 35 lb. per animal, compared to around 31 lb. a year before.

Spinach for canning produced in 1942 in California and Texas is expected to total 55,270 tons, up 85 percent over the 29,900 tons harvested last year.

Beets canned in 1941 are now reported to have totaled 6,428,630 cases, a new record and almost double the previous record 1940 pack.

Pea acreage for canning and freezing in 1942 is expected to be 487,130 acres, compared to 385,460 acres planted in 1940.

Grapefruit production in the current crop year is estimated by U. S. Department of Agriculture at 41,540,000 boxes.

Livestock on farms at the beginning of 1942 was valued at $7,008,411,000, compared with $5,320,000,000 a year before.

Cattle and calves, all purposes, on farms in January, 1942, numbered 74,607,000, up from 71,461,000 at the start of 1941.

Milk cows and heifers on farms in January, 1942, numbered 26,303,000, compared to 25,478,000 a year earlier.

Sheep and lambs on farms in January this year numbered 55,979,000, compared to 54,283,000 in January, 1941.

Hogs and pigs on farms in January, 1942, totaled 60,526,000, up from 54,256,000 a year before.

Chickens on farms at the first of this year numbered 473,933,000. The total was 422,909,000 in January, 1941.

Turkeys on farms in January of this year totaled 7,710,000 compared to 7,252,000 a year earlier.

Eggs, liquid, produced in January, 1942, totaled 17,881,000 lb., compared to 2,178,000 lb. produced in January, 1941.

Eggs, dried, whole, produced in January, 1942, totaled 6,526,937 lb. None of this product was made in January last year.

Butter, creamery, produced in January, 1942, totaled 121,410,000 lb., 10.5 percent below January, 1942, but 1.7 percent above the 1931-1940 January average.

Cheese, American, produced in January, 1942, was 56,075,000 lb., a new January record, 52 percent above January, 1941, and 112.2 percent greater than the 1931-1940 January average.

Evaporated milk production in January, 1942, is estimated to have been 310,952,000 lb., a new record, an increase of 82 percent over January, 1941, and 138 percent over the 1936-1940 January average.

Milk, fluid, sold in January, 1942, was 4.59 percent greater than in January, 1941, according to the Milk Industry Foundation.

Milk equivalent consumption of all dairy products in 1942 is estimated at 825 lb. per capita.

Oleomargarine sales in January, 1942, as indicated by sales of internal revenue stamps, totaled 35,279,840 lb., 3.9 percent below sales in January of last year.

Dry skim milk production in January, 1942, is reported at 38,350,000 lb., compared to 34,000,000 lb. in January, 1941, and to 29,295,000 lb. as a 1936-1940 January average.

Fruits, frozen, in storage March 1, 1942, totaled 139,846,000 lb., compared to 114,854,000 lb. on March 1, 1941, and to a 1937-1941 average of 97,907,000 pounds.

Vegetables, frozen, in storage on March 1, 1942, totaled 72,669,000 lb., compared to 63,101,000 lb. a year before.

Butter, creamery, in storage on March 1, 1942, totaled 63,721,000 lb., compared to 16,462,000 lb. on March 1, 1941, and to a 1937-1941 average of 33,891,000 pounds.

Cheese, all kinds, in storage on March 1 of this year amounted to 159,973,000 lb. The quantity a year before was 119,381,000 lb., and the average for the date in 1937-1941 was 94,537,000 pounds.

Eggs, case equivalent, in storage on March 1, 1942, totaled 2,486,000 cases, compared to 1,513,000 cases a year earlier and to a March 1 average in 1937-1941 of 1,569,000 cases.

Poultry, all kinds, in frozen storage on March 1, 1942, amounted to 178,829,000 lb. A year before the figure was 163,321,000 lb. and the March 1 average in 1937-1941 was 136,531,000 pounds.

Meat, all kinds, in cure and frozen storage, totaled 893,747,000 lb. on March 1, 1942, compared to 983,685,000 lb. on March 1, 1941, and to 855,881,000 lb. as a March 1 average in 1937-1941.

Lard in storage, March 1, 1942, was 226,519,000 lb. and rendered pork fat on the same date totaled 4,631,000 lb. On March 1, 1941, the combined figures for these products totaled 317,431,000 lb. and the average for the date in 1937-1941 was 205,604,000 pounds.

Weekly wholesale food price index of Dun & Bradstreet at $3.59 on March 10, 1942, compared to $2.61 a year before and was the highest in 16 years.

Business activity index of **Business Week** stood at 173.0 on March 7, 1942, up from 170.1 on February 7 and comparing to 149.6 on the corresponding date of 1941.

You Can Do It FASTER with MODERN SCALES

To speed compounding of materials, this Fairbanks Dial Scale was built into a charging car which travels in a pit. At the touch of a button the Printomatic gives an accurate printed record of each batch.

● Rare is the weighing job which can't be done faster and more precisely with today's vastly improved scales. These scales *print* weight records more quickly than a man can read and write them. They *eliminate human errors.* They weigh while materials are *on the move.*

But—important as those advantages are—don't dismiss modern scales as nothing more than better weighing instruments. For scales have assumed amazing *extra* functions which often speed production surprisingly. They *count* small parts and products. They furnish weight records for accounting and inventory control. They weigh and disburse preset amounts *automatically,* and can keep ingredient proportions *secret!*

WE WANT TO HELP YOU

We are anxious to do everything we can to help speed American production. Possibly our scale engineers could suggest new and more efficient applications of scales in *your* plant, or modifications of your present scales to attune them to today's tempo. Write Fairbanks, Morse & Co., Dept. D209, 600 S. Michigan Ave., Chicago. Branches and service stations throughout the United States and Canada.

FAIRBANKS·MORSE SCALES

DIESEL ENGINES ELECTRICAL MACHINERY MAGNETOS RAILROAD EQUIPMENT WASHERS-IRONERS STOKERS

MEN · JOBS · COMPANIES

INDUSTRY

Banner Creameries plans to construct a large two-story building in Midland, Tex., complete with modern cheese-processing equipment. O. D. Dillingham is owner of the creameries.

British Columbia Packers, Ltd., Vancouver, B. C., has been granted a license to can tuna at Kildonan Cannery on Barkley Sound, marking a new expansion in its fishery operations.

California Packing Corp. has abandoned plans for a new seafood products cannery at San Diego. The Navy has taken over many of the larger fishing boats serving the California canneries.

Canada Egg Products, Ltd., Saskatoon, Sask., is dehydrating eggs for shipment to Britain with production soon to reach a volume of 12,000 eggs handled daily.

Corn Products Refining Co. is beginning a $2,000,000 expansion of its Kansas City plant, and will double the capacity of its anhydrous sugar unit there as part of the program.

East Jordan (Mich.) Canning Co. lost $100,000 in a fire which recently destroyed its warehouse, with 20 carloads of canned goods.

Egg Processes, Inc., is constructing a new egg drying plant at Osage City, Iowa. A recently installed plant at Cedarburg, Wis., is in operation.

Florida Citrus Canners Cooperative will build a large orange juice concentrates plant at Lake Wales, Fla., to supply the Army, Navy and Great Britain under Lease-Lend. Construction of new buildings will be rushed to completion by May 1, with seasonal capacity estimated at 500,000 gal. Harold S. Norman is president of the cooperative.

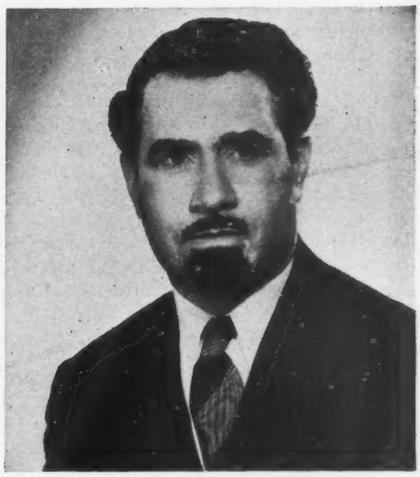
H. J. Heinz Co. is constructing a new $75,000 warehouse and distributing plant in Berkeley, Calif.

Jewett & Sherman Co. (Holsum Products) Milwaukee, is celebrating its diamond anniversary this year. Beginning 75 years ago as a dealer in coffee and spices, Holsum Products is now a leading packer, with branches in Brooklyn, Cleveland, Chicago and Kansas City. Its latest nationally advertised product is "Peanut Crunch," an improved peanut butter.

Kingan & Co., Indianapolis, is introducing "Tasti-Squares," a vacuum-packed meat product, marketed in 5-lb. and 2-lb. "Pliofilm" packages. The Tasti-Square package won a top award in the annual All-American Package Competition.

W. E. CARTER

Kroger Grocery & Baking Co. has promoted W. E. Carter to manager of the eastern division, with supervision over the Toledo, Columbus, Pittsburgh and Cleveland branches, succeeding Joseph Hall who now heads manufacturing activities in Cincinnati. Mr. Carter has been branch manager at Cleveland.



HUGH H. DARBY

Borden Vitamin Co. has announced that Dr. Hugh H. Darby, well-known scientist and author, has joined its staff for research and development in the production and application of vitamins and hormones. Dr. Darby has been with the Biochemistry Department of the College of Physicians and Surgeons, Columbia University.

Kraft Cheese Co. is constructing a new processing plant at Fayetteville, Tenn. The plant, located in a productive dairy center, will be one of the largest of its kind in the South.

Kroger Grocery & Baking Co., Cincinnati, Ohio, has purchased the plant of Lewis Packing Co., South Omaha, Neb., and will install beef-tenderizing equipment there in the near future. Robert C. McClements will be retained as superintendent.

Thomas J. Lipton, Inc., Hoboken, N. J., has acquired the Sweet Canning Co. factory at Albion, N. Y., where it will pack dehydrated vegetables and its "Continental" dehydrated soups. Personnel of the factory will be retained.

Loudon Packing Co., Terre Haute, Ind., has purchased the Lippincott Co. plant at Napoleon, Ohio. The plant cost about $125,000 when built four years ago.

Nolde Brothers has begun a $40,000 expansion at its Richmond, Va. baking plant to provide more space for its cake department.

Siebel Institute of Technology, Chicago, Ill., will continue both its fall technology courses and its regular courses for bakers for the duration of the war, because of the necessity of training men to fill key positions now open in the baking industry.

Stokely Brothers & Co., Indianapolis, is constructing a canning and processing plant in Houston, Tex.

PERSONNEL

Edward R. Boylan has been elected president of Cary Maple Sugar Co., Inc., St. Johnsbury, Vt., succeeding the late Preston Herbert. Augustus Conlin was elected executive vice-president.

Charles C. Cabot, Byron C. Foy and H. C. Von Elm have been appointed directors of National Dairy Products Corp. to fill vacancies.

S. F. Cahill has retired as manager of the Little Rock, Ark., branch of Swift & Co., after 41 years of service.

John W. Coatsworth, authority on vitamin oils, has joined the Borden Vitamin Co. division of Borden Co. Mr. Coatsworth was formerly with Wilbur Ellis Co., New York, brokers in vitamin oils.

W. F. Cozad, Omaha, Neb., and C. W. Roberts and J. Lee Rankin, Lincoln, Neb., have been elected to the board of directors of Roberts Dairy Co., Omaha.

Dr. J. W. T. Duvel, associate chief of the Commodity Exchange Administration, widely known for his work in grain standardization and Federal regulation of futures trading, retired after more than 36 years of service in the Department of Agriculture.

Gerald A. Fitzgerald has resigned from

the research department of General Foods Corp. to become food technologist for Richardson & Robbins Co., Dover, Del.

George Gelman, formerly technical director for Ovson Egg Division, National Dairy Products Co., Inc., has been commissioned a lieutenant and assigned to the Quartermaster Subsistence Research Laboratory, Chicago, Ill.

Walter Graefe, president of Pomona Products Co., Griffin, Ga., has been appointed to the advisory committee of OPA. He will head the food division, handling canned, dried and frozen fruits and vegetables.

Joseph W. Hicks, Chicago, vice-president of E. J. Brach and Sons, Chicago candy manufacturers, has been appointed director of public relations of National Confectioners Association.

Richard Hull, Atlanta, Ga., has been elected president of Georgia Dairy Association. Vice-president is E. C. Bull, Savannah.

ALADAR FONYO

William J. Stange Co., Chicago, manufacturers of processed meats, sausage, canned food seasonings and flavors, recently made Mr. Fonyo a vice-president. He is chief chemist of the company.

C. P. McCormick, president of McCormick & Co., spice, tea and extract house of Baltimore, Md., will serve on Jesse Jones' Business Advisory Council of the Department of Commerce.

Bernard Megaffin has been appointed senior executive of Red Star Milling Co., Wichita, Kan., succeeding the late J. B. McKay.

Charles J. Meister, Fairmont (Minn.) Canning Co., has been elected president of Corn Canners Service Bureau.

Derrill B. Pratt, formerly with Morten Milling Co., Dallas, Tex., has become chemist in charge of the laboratory of B. A. Eckhart Milling Co., Chicago, Ill., succeeding W. G. Epstein, who is now with Doughnut Corp. of America.

William M. Robbins, president of General Foods Sales Co. Inc., has been elected vice-president of General Foods Corp. Ernest L. Woodward has been appointed director to succeed Robert T. Stevens, resigned to become an Army officer.

Armour & Co. has opened a new plant in Jersey City, N. J., for the manufacture of hydrogenated shortening. The plant is equipped with the most modern type of production and control equipment.

Paul C. Wilbur, formerly with Richmond-Chase Co., San Jose, Calif., has been appointed director of research, Food Machinery Corp. R. B. Richmond will take over management of plant operations at Richmond-Chase Co.

Woodson K. Woods, senior vice-president, Ralston-Purina Co., St. Louis, has retired because of ill health. He will continue as a member of the board.

C. R. Zimmermann, Wheeler-Barnes Co., is the new president of Peanut Butter Manufacturers Institute. Vice-president is R. B. Lustig, Hogue Mercantile Co.

DEATHS

Joseph J. Berry, founder of Meeker Sugar Refining Co. in 1912 and 30 years its president, Mar. 6, in Alexandria, La.

Walter S. Frisbie, 61, chief of the Office of State Cooperation of the Food and Drug Administration, and chairman of the Foods Standards Committee, recently, in Washington, D. C.

Oscar P. Goodman, 77, retired secretary-treasurer of Omaha Cold Storage Co., recently, in Omaha.

George W. Harrod, 68, chief engineer for Morgan Packing Co., Scottsburg, Ind., recently, in Scottsburg.

Anton Hullman, 45, president of Hullman & Co., Terre Haute, Ind., baking powder manufacturers, recently, in Miami, Fla.

Charles Rode, 66, vice-president and general manager of Tell City (Ind.) Flouring Mills, recently.

Hubert Stuart Wilders, 37, manager of National Biscuit Co., Vancouver, B. C., recently, in Vancouver.

William G. Wrightson, 59, vice-president of the Great Atlantic & Pacific Tea Co., Mar. 8, in Orange, N. J.

ASSOCIATED INDUSTRIES

Acme Steel Co., Chicago, is promoting the sale of U. S. Savings Bonds on dividend checks to stockholders. Printed on the form with the Savings Bond appeal is the statement that more than 70 percent of Acme employees are buying bonds on the payroll allotment plan.

Allis-Chalmers Manufacturing Co. has announced appointment of Edwin H. Brown as vice-president in charge of engineering and development. He has been head of the engine and condenser department of the company since 1935.

Jabez Burns & Sons, Inc., announces that J. L. Kopf has been named general manager of the firm.

Felton Chemical Co., Brooklyn, N. Y., collaborating with Pasco Packing Association, has installed a new plant in Dade City, Fla., for large-scale production of cold-pressed oil of orange and oil of grapefruit.

Mathieson Alkali Works, Inc., in cooperation with Defense Plants Corp., is constructing a new plant at Lake Charles, La., for the production of metallic magnesium and chlorine.

Monsanto Chemical Co., St. Louis, is converting its recently acquired property at Texas City into a plant for manufacturing chemicals needed in production of synthetic rubber.

Republic Filters, Inc., is the new name of American Seitz Filter Corp., New York, which has changed its corporate name to eliminate any impression of alien associations and to identify its ownership as patriotic American.

Roller-Smith Co. has announced that J. D. Wood has resigned as president, to devote his entire time to his duties as chief engineer as a result of greatly increased engineering activity. Reg Halladay, a director of the company, has become president.

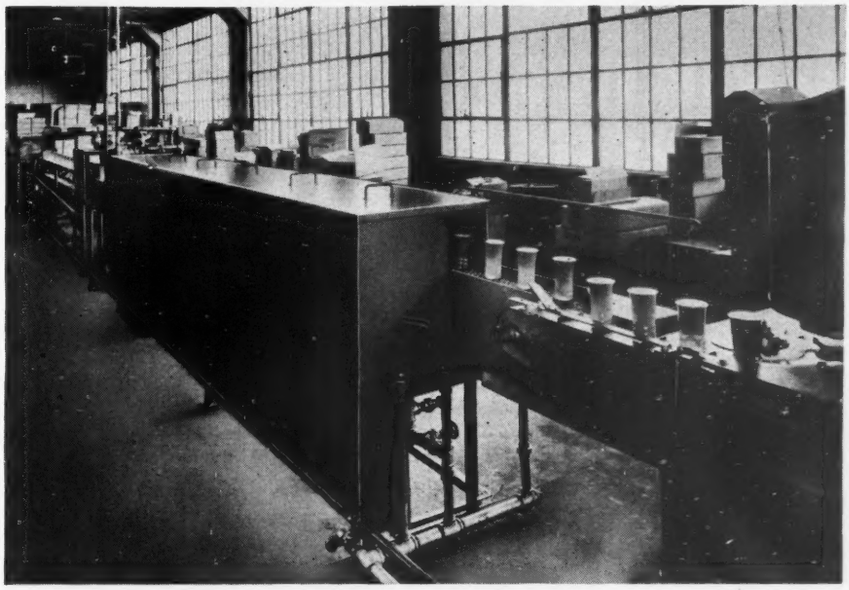
Sutherland Paper Co., Kalamazoo, Mich., has made Louis W. Sutherland chairman of the board. He is succeeded as president by Robert E. Rutledge.

FOOD EQUIPMENT NEWS

Insulating Material

REYNOLDS METALS CO., 8210 E. Franklin St., Richmond, Va., has brought out an insulating material made of cotton, and claims that this has the highest insulating value of any commercial material now available. The cotton fibers used in this insulation are treated so as to be water repellant, flameproof and fire-resistant. The material is light in weight and the maker claims that it can be installed easily without expensive tools and with very little waste.

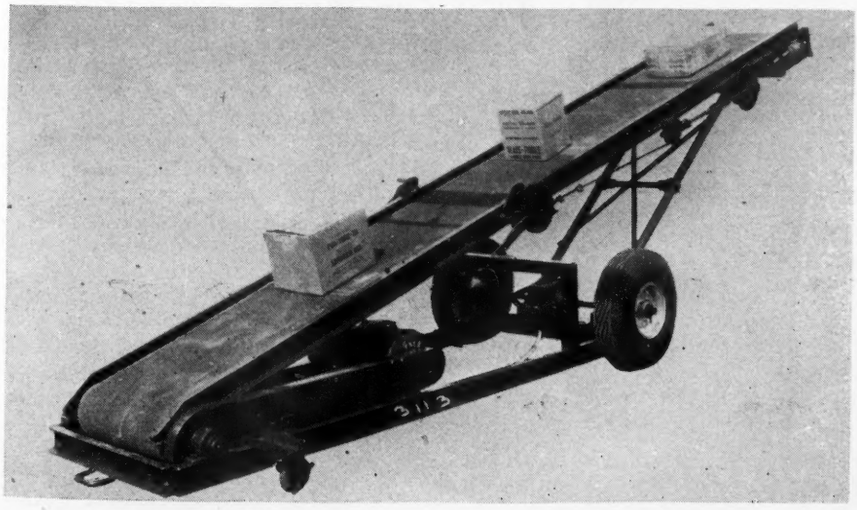
While at the present time this insulation material is going mostly into defense housing projects and army construction, the makers expect this product to serve in refrigerated room insulation and in insulation of refrigerated cars and truck bodies.



Cooler, washer and conveyor for filled jars.

Portable Belt Conveyor

A REVERSIBLE PORTABLE BELT conveyor for use in piling, loading and unloading operations has been brought out by Standard Conveyor Co., North St. Paul, Minn. A feature of this conveyor is the rubber-tired wheels which make it possible to move the machine from one site to another by simply hooking the lower end to a motor truck or other mover. In addition, the casters at the lower end are rubber-covered, for easy movement. The elevation of the upper end of the conveyor is raised or lowered by means of a crank at the side. The conveyor has a safe maximum piling height of 8 ft., but will in special cases pile up to 10 ft. The minimum piling height is 4 ft. It is provided with a rough top belt in order to keep packages from slipping when the conveyor is set for high elevations.



Portable conveyor for piling, loading and unloading operations.

Jar Cooler, Washer and Conveyor

THE ISLAND EQUIPMENT & SUPPLY CO., INC., 101 Park Ave., New York, is now making the "Ultimate" jar cooler, washer and conveyor. With this machine jars or containers can be labeled by hand or automatically immediately after they are filled and capped, as the jars are gradually cooled to handling temperature and cleaned of any spillage by a spray of water while on a series of endless conveyors. Only a relatively small quantity of water is required for the cooling because the system makes use of regenerating and recirculating principles.

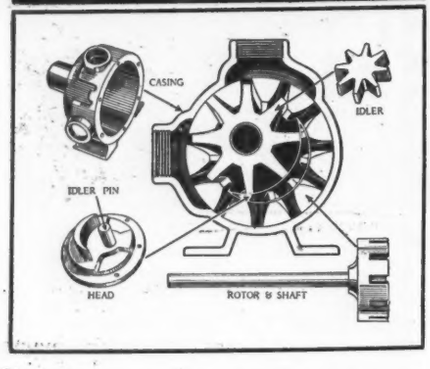
The manufacturer claims that with this device it is not necessary to set aside jars from the capper or labeler to cool, thus interruptions in operation are avoided. The jars come off the filling line immediately so that the cartons are ready for shipment a few minutes after they have been filled, thus rehandling and repacking are avoided and much time and labor saved.

The new device is driven from one motor. The conveyor belts in the cooler are side by side, varying from three to five lines, and run in alternate directions. Were the same distance to be traveled by one belt alone it would have to be of considerable length, but with this construction 45 ft. of effective cooling and washing space are obtained in a 15-ft. machine. The cooler can be supplied to handle from 40 to 120 jars of product per minute in sizes from 4 oz. to 32 oz. It will reduce temperature from 210 deg. F. to 90 deg. F. in ten minutes and uses not over 20 gal. of 70-deg. F. city water per minute.

"Defense" Paints

A LINE of five different paints, designed to provide civilian markets with products to replace unavailable aluminum paint, has been announced by American-Marietta Co., 43 East Ohio

IT PAYS
To Remember
The Original
VIKING PRINCIPLE
When Specifying
ROTARY PUMPS



New men who have the important responsibility of specifying equipment find . . . just like the old-timers have . . . that it pays to place quality and dependability *first* when buying rotary pumps. Vikings, with only 4 major parts and just 2 moving parts . . . the famous "Gear Within A Gear" principle . . . lead in their field. Your judgment will be proved right when you specify Viking Rotary Pumps. They deliver on every job. Bulletin 802-35 shows you why. It's free. Write for it today.

★ ★ ★

VIKING
PUMP COMPANY
CEDAR FALLS, IOWA

St., Chicago. Introduced as members of the company's "Defense Line" and adapted for new construction and maintenance applications, these paints may be applied by either brushing or spraying.

Among the paints are the following: Valdura Tank White, introduced to replace aluminum paint in applications where it is desirable to cut evaporation losses and to reduce inside temperature, having a reflectivity factor 10 to 15 percent higher than aluminum, and resistant to oil and water; Valdura Metal Lead paint, a protective lead-colored, metal coating for metal surfaces, including new or old galvanized metal. This paint is said to provide a leafing action similar to that of aluminum and to afford a coating highly resistant to acid, alkalis, fumes, rust and moisture: two Valdura Defense Grays, available in light and neutral shades, designed to provide low cost effective protection and long durability on exposed metal surfaces such as tanks, fences, structural steel, water towers, power line towers, and similar constructions: Valdura Enamelized Yellow Metal Primer, designed as a primer for all metal surfaces, particularly where metal is subjected to moisture.

Candy Wrapping Machine

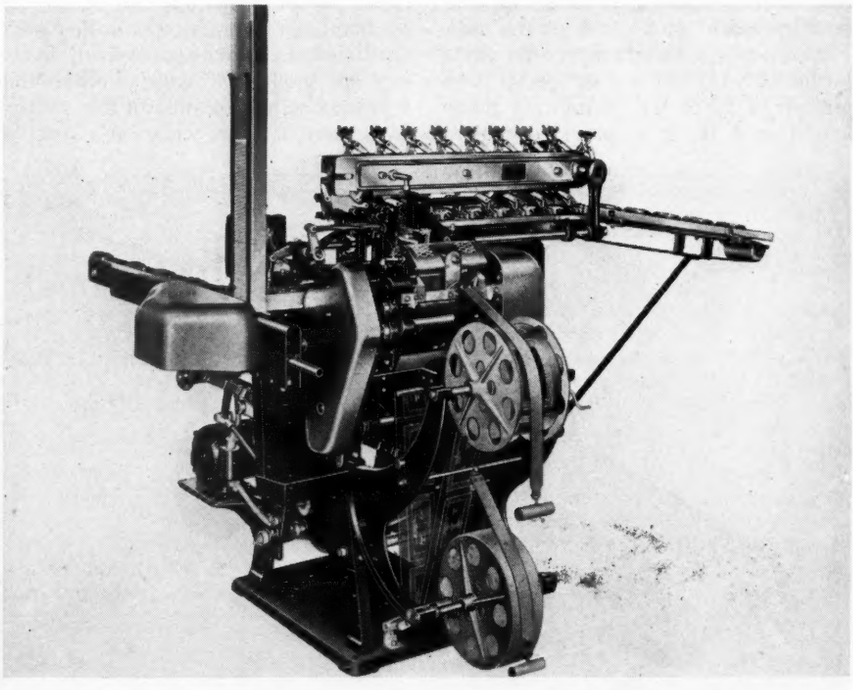
A HIGH SPEED candy wrapping machine designed for wrapping soft or irregularly shaped candy pieces, has been brought out by Modern Equipment Corp., Defiance, Ohio, under the name of "Wrap-O-Matic". Adapted for wrapping candy bars of all shapes and consistencies, this machine operates at 90 to 120 units per minute depending on the product and the method in which the product is delivered to the machine. It can be used with or without liners, with or without cardboards, and with such wrapping materials as glassine, transparent cellulose, Revelation wrapper, foil, heat-sealing papers, or any other type of wrapper that can be printed in rolls. Positive registration of the printing is effected by electric eye control. The machine can be supplied in either side intake or straight intake design.

Small Sized Homogenizer

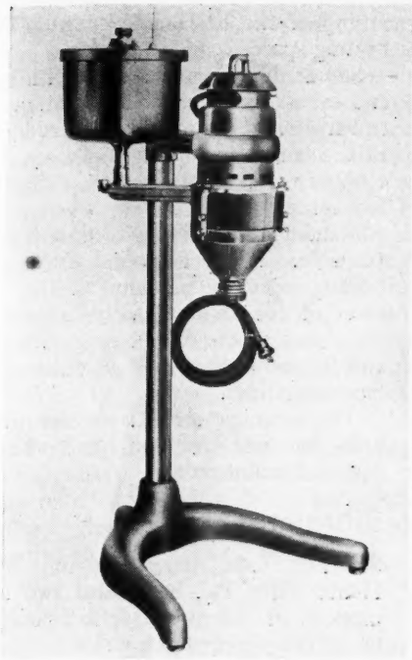
HOMOGENIZER CORP., LTD., 3614 W. Pico St., Los Angeles, Calif., is making a small sized homogenizing machine suitable for use in dairies, ice cream plants and similar operations. This device, as shown in the accompanying illustration, is mounted on a stand which holds the motor, homogenizing unit and feed hopper. Its operating rate is up to 100 gal. per hour and it is equipped with a high speed universal motor operating on a.c. or d.c. current of 120 volts, although other voltages can be furnished on special order.

In operation, the liquid being homogenized is forced by centrifugal force through minute holes against the cutting edges of 125 steel knives. At the rate of operation, this is said to produce 1½ million cuts per minute with sufficient force to break up and cut the butterfat globules, reducing them in size from their natural state of 10 to 20 microns to a size of about 1 micron diameter.

The homogenizer is constructed of



High speed wrapping machine adaptable to a wide range of sizes and shapes of candy bars.



Small sized homogenizer for dairy plants, ice cream mix plants and similar operations.

approved dairy equipment materials. It can be readily disassembled and sterilized in a very small sterilizer with minimum of labor. The stand provided with the homogenizer is adjustable in height, in order that the machine may be fitted into the needs of varying plants.

Fastening for Covers

Elastic Stop Nut Corporation, 2332 Vauxhall Road, Union, N. J., has developed its anchor type nut for blind mounting applications on general industrial equipment. These are in general for the purpose of providing vibration-proof fastenings for removable plates such as covers for hand-holes, access and inspection openings and also for other types of blind mounting attachments. In this application, the anchor nuts shown in the accompanying illustration are permanently riveted to the inside of the structure. The bolts, which are inserted from the outside, pass first through the removable plate and then through the structure, into the stationary nut.

These nuts are offered in a wide range of sizes, materials and thread systems. Each nut incorporates the basic Elastic Stop self-locking feature, which is a fiber locking collar as an integral part of each nut. The purpose of this fiber locking collar is to prevent the bolt from becoming loose after it is installed in the nut, regardless of the severity of the vibration to which it is subjected. The manufacturer states that the bolt may be removed and replaced many times, and that the anchor nuts will retain their locking ability because of the physical characteristics

Make man-hours and man-power count more effectively—get more production every hour of the 24-hour working day. Put Standard Conveyors to work—let them do the transportation in your plant—provide for a smooth, uninterrupted flow of materials and parts from receiving platform to machines—department to department—assembly or packaging lines to shipping floor.

Standard Conveyor engineers can help you plan and install conveying equipment in your plant that will speed production—relieve costly congestion of work in process—accelerate the production pace all along the line.

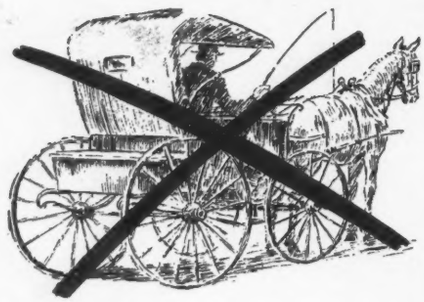
Booklet Shows Variety of Conveyor Applications and Possibilities:

Send for booklet FI-4 "Conveyors by Standard"—a valuable reference book on conveying and conveying methods—contains many installation pictures representing practically all industries—suggests best types of conveyors to use for particular applications.

STANDARD CONVEYOR COMPANY

General Offices: North St. Paul, Minn.

Sales and Engineering Offices in Principal Cities



It's the "Machine Age" for the **POTATO CHIP BUSINESS** *too!*

"Horse and Buggy" methods of producing chips can't possibly compete with

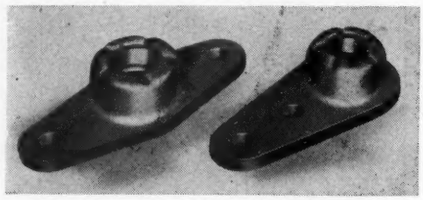
FERRY CONTINUOUS POTATO CHIP MACHINES

Old-fashioned methods are not only more expensive, but the quality is inferior to the product of these completely automatic machines. One operator can turn out 250 lbs. of perfect chips per hour without fatigue, because from raw peeled potatoes to finished chips his only job is to inspect the slices and control machine. Scores of Ferry machines have been in operation for many years, producing top-quality, top-profit chips all day and every day . . . Write for Bulletin F.I. which gives complete details on our various models.

J. D. FERRY CO.
129 SO. CAMERON ST.
HARRISBURG, PA.

of the material used in the fiber collar.

Another advantage for this type of nut is claimed as follows: when the end of the bolt enters the unthreaded collar its passage is resisted and contact is established with the load carrying threads under pressure. Further turning and tightening of the bolt impresses a thread in the fiber collar and thus creates a moisture-tight seal around the bolt.



Anchor nut type for use in blind mounting of hand-hole covers and similar equipment.

Air Conditioning

CARRIER CORP., Syracuse, N. Y. has brought out a line of self-contained air conditioning units to provide sizes and capacities to meet the requirements of a large number of industrial establishments. There are four of these types, in varying sizes and capacities, all of them able to provide either summer air conditioning alone or year-round air conditioning and humidifying facilities.

The units are completely self-contained and are shipped from the factory assembled. The summer air conditioning units include dehumidifying, cooling and air circulation equipment while the winter unit embodies heating and humidifying facilities. Two models are available in four sizes, one with a removable head shell and cleanable tube condensers for heat disposal by city or well water; the other for connecting to an evaporative condenser which reduces water usage as much as 95 percent, disposing of the heat removed from the heating space.

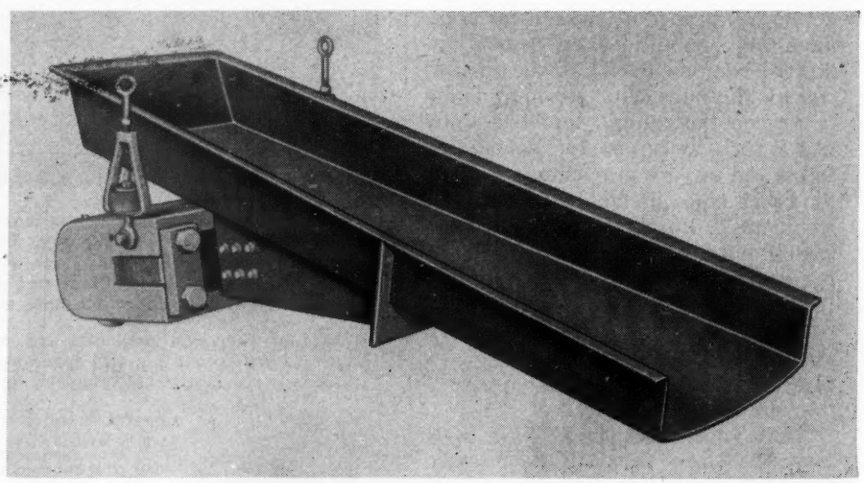
Standardized bypass section with face and bypass dampers and automatic control if desired are provided, in addition to the control flexibility and operating economy of two parallel air circuits and two compressors in the larger capacities. A standard air filtering section is also available. The year-around air conditioning assembly provides all the features of the summer air conditioning unit, plus steam or hot water heating and humidification with an evaporative type humidifier.

The manufacturer claims for these units low first cost and low operating cost and maintenance.

Vibratory Feeders

SYNTRON Co., 460 Lexington Ave., Homer City, Pa., has added two new models of electromagnetic vibratory feeder conveyors to its line. Of these, the Model F-4 has a capacity up to 100 tons per hour of coarse material and carries feeder pans as wide as 36 inches and as long as 60 inches. The larger model, Model F-5, will handle up to 500 tons per hour, and has troughs as wide as 48 inches and from 60 to 96 inches long.

These feeders are vibrated at high speeds by a pulsating electromagnet. The magnet is energized by means of a rectifier tube. Advantages claimed for this design of feeder include "finger-tip" rheostat control of the rate of flow, permitting a range of speed from capacity down to a slow dribble. Another feature is the entire absence of moving parts.



Model F-5 heavy vibratory feeder for crushed materials in capacities up to 500 tons per hour.

Acid Detergent

C. W. BONEWITZ CHEMICAL Co., Burlington, Iowa, is producing an acid cleanser for equipment used in dairy and other industries under the name of

"Mikro San". This is a cleaning compound that is acid in reaction instead of alkaline. It was developed primarily for milk and cream can washing and for cleaning equipment, but is also recommended by the maker in the washing and sterilizing of walls, ceilings and windows and other parts of a plant. It contains a wetting agent and water-softening material which are the actual cleaning ingredients. The vehicle for these cleaners is a combination of non-caustic organic acids which aid in preventing the formation of milkstone and inhibit the growth of objectionable bacteria on the equipment.

It is stated that although acid in reaction, this cleansing agent is less corrosive by a considerable amount than alkali cleansers used for the same purposes.

Smoke Alarm

PHOTOSWITCH, INC., 21 Chestnut St., Cambridge, Mass., has developed the Type A25C photoelectric smoke alarm. The purpose of this device is to indicate the degree of density of smoke passing through a stack from a boiler or other combustion apparatus and to signal to the operator the condition that exists so that the efficiency of combustion can be regulated.

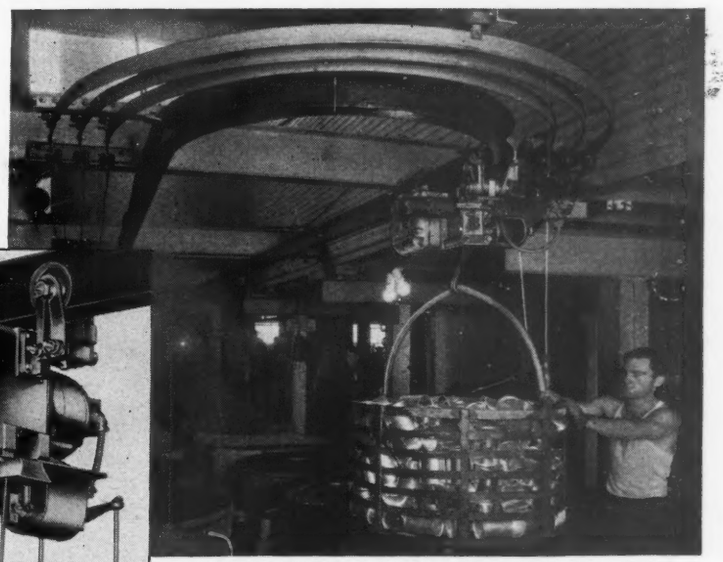
The equipment consists of a photoelectric control, a light source and an indicator. The control and the light source are mounted on opposite sides of the flue or stack aligned so that the light may be projected onto the eye of the photoelectric control. The control is wired to the indicator, which

Smoke alarm for indicating smoke density

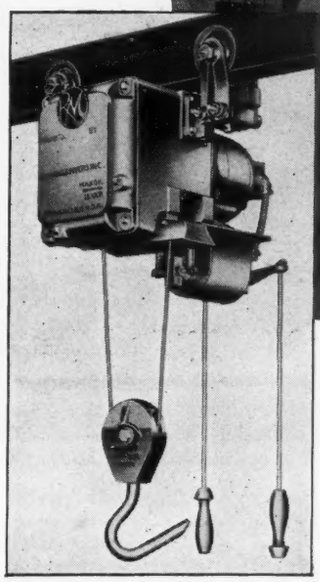
may be located at any point for observation by the power plant operator. This indicator gives a continuous indication of the smoke density.

Keep Production at Peak

WITH R & M FOOD HOISTS



Canned goods headed for grocers' counters—and fast! Note low headroom and wide operating range of this special R & M canner's electric hoist, handling peak production without a whimper, for a leading food plant.



This R & M electric canner's hoist takes overload production in easy stride. Capacity is 1,000 lbs. and hoisting speed 32 feet per minute with standard lift of 20 feet. Oil bath enclosure prevents drippings and easy-moving ball bearing trolleys provide swivel action for curved I-beam track. Note special, time-saving canner's hook.

WITH production pressure on, as it is these days, every wasted minute in handling operations means drastic losses. Step up your output, keep handling costs down to a minimum with powerful, speedy R & M electric hoists.

You can choose from 2,000 stock models—all built to quality standards, designed to deliver maximum lift in minimum headroom space. Or if your setup is decidedly unusual, R & M food plant specialists will quickly build the *right* hoist to fit the job.

It will pay you to "take it up" with R & M. Consult the nearest R & M sales and service office listed in your telephone directory or the following canning machinery manufacturers who handle R & M hoists:

A. K. Robins & Co.....Baltimore
Berlin Chapman Co.....Berlin, Wis.
Chisholm-Ryder Co.....Niagara Falls
Sprague-Sells Corp.....Hoopeston, Ill.
F. H. Langsenkamp Co.....Indianapolis
Dunkley Co.....Kalamazoo, Mich.

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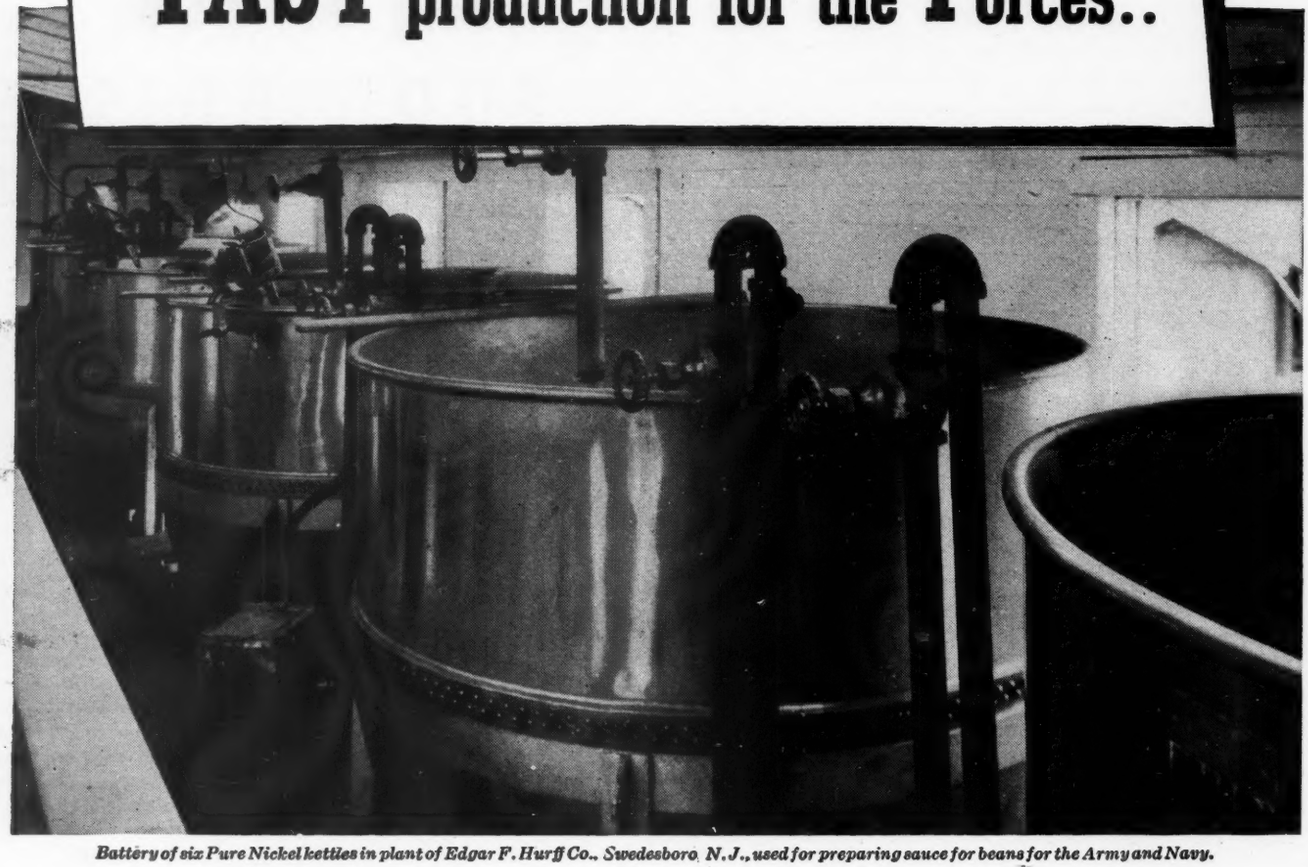

Battery of six Pure Nickel kettles in plant of Edgar F. Hurff Co., Swedesboro, N. J., used for preparing sauce for beans for the Army and Navy.

Nickel kettles installed 10 years ago now do duty for the Army and Navy

About the time the U.S. cruisers "Chicago," "Louisville" and "Augusta" were commissioned, a battery of Nickel kettles was put to work in a food plant. The cruisers are now in action for Uncle Sam—and so are the Nickel kettles.

Installed in the cooking room of the Edgar F. Hurff Company, Swedesboro, N. J., these Nickel kettles are used for preparing sauce for beans for the Army and Navy. Like the soldiers and sailors who eat the beans, the Nickel kettles work *fast*. In a test, they heated 300 gallons of tomato juice from 78° F. to 188° F. in seven minutes with steam pressure of 115 p.s.i.... faster than any other equally strong and corrosion-resistant metal could do the job.

Because of its fast-cooking qualities, combined with strength, durability and economy, Nickel has long been an important food processing material. Today, this sanitary metal is filling a vital need in all-out production for Victory.

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BOOKLETS • LITERATURE • BULLETINS

FOOD PLANT EQUIPMENT

Filters—Oliver-Beatty filters, of the pressure type, suitable for filtering and clarifying such liquid products as fruit juices, sirups, wine and beer, are described with specifications in Bulletin No. 123 of Oliver-United Filters, Inc., 33 W. 42nd St., New York.

Grinding Equipment—Various types of ball and pebble mills, such as are suitable for the processing of sugar, dehydrated vegetables, chocolate and other food preparations, either wet or dry, are described with specifications in Catalog No. 55, issued by Abbé Engineering Co., 50 Church St., New York.

Magnetic Separators—The use of double gap magnets in various applications for the removal of tramp iron from moving streams of material is illustrated and set forth in 12-page catalog No. 301 issued by Dings Magnetic Separator Co., Milwaukee, Wis.

Materials Handling Equipment – Gravity roller conveyors, straight and spiral chutes, power roller, belt, chain, slat and pusher bar conveyors, together with lifting, piling and portable tiering machines are discussed in a new general catalog of materials handling equipment, Catalog No. 105, published by Standard Conveyor Co., North St. Paul, Minn.

Overhead Conveyors—Engineering and application data covering the use of overhead conveyors of the "Tramrail" type are given in a 12-page illustrated bulletin, No. 2008-A, published by the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

Processing Equipment—"What to Look for When you Specify Stainless Steel for your Processing Equipment" is the title of a bulletin discussing that problem issued by S. Blickman, Inc., Weehawken, N. J.

PLANT SUPPLIES

Centrifugal Pumps—Featuring double-seals and a rotatable discharge, "Kimballectric" horizontal centrifugal pumps, in sizes from 10 to 1500 g.p.m. for heads up to 250 ft. are described with specifications in 8-page bulletin No. 120-A issued by Kimball-Krogh Pump Co., 301 W. Ave. 26, Los Angeles, Calif.

Electric Motors—Single-stage, direct current, and small polyphase motors, are described, in various forms and for various applications, in Bulletin MU-183, a 36-page illustrated publication of Wagner Electric Corporation, 6400 Plymouth Ave., St. Louis, Mo.

Maintenance Tools—A wide variety of electric driven maintenance tools including drills, hammers, cutters, grinders and wraglers, are described in Catalog No. 45, published by Wodack Electric Tool Corp., 4627 W. Huron St., Chicago, Ill.

Safety Scaffolding—"Quik-Set" safety steel scaffolding for use in such operations as painting, repairing and maintenance is described in an 8-page illustrated bulletin issued by Mechanical Handling Systems, Inc., 4600 Nancy Ave., Detroit, Mich.

Steam Traps—Impulse steam traps, their construction, operating principles, insulation, capacity, prices, weight and dimensions, together with typical installation pictures, are shown in 16-page Bulletin T-1736, published by Yarnall Waring Co., Chestnut Hill, Philadelphia, Pa.

Vertical Pumps—The increase in efficiency of vertical pumps of the deep well turbine type, through a new design of vane, is set forth in information bulletin No. 7-A257 published by Pomona Pump Co., 4301 S. Spring Ave., St. Louis, Mo.

Water Treatment—Information on various types of chemical additions used for the supplementary treatment of boiler feed water, is contained in Bulletin 2420, published by the Permutit Co., 330 West 42nd St., New York.

Water Treatment—A bulletin discussing when industrial plants should use the Zeolite process for softening water, and when, in contrast, they should use the lime and soda process, has been issued as Bulletin No. 112 of American Water Softener Co., Lehigh Ave. and 4th St., Philadelphia, Pa.

LABORATORY CONTROL

Laboratory Instruments—"New Instruments for a Modern World" is the title of a 20-page illustrated bulletin describing precision instruments such as photofluorometers, spectrophotometers, and other electrical devices, issued as Bulletin No. 104 by Coleman Electric Co., Inc., and distributed by Wilkens-Anderson Co., 111 North Canal St., Chicago, Ill.

Spectrophotometer—A recording photo-electric spectrophotometer for use in the accurate determination and measurement of color, as in the grading of canned foods, is described with illustrations in an 8-page bulletin, GEA-3680, published by General Electric Co., Schenectady, N. Y.

TRUCKS AND TRACTORS

Tire Saving—A handbook giving timely information concerning the best ways of conserving truck tires under the present rubber restrictions, together with much other information valuable to food companies using motor trucks, has been issued under the title of "Operators Handbook" by B. F. Goodrich Co., Akron, Ohio.

Truck Brakes—Three types of air brakes for trucks, tractors and other automotive equipment: the Hydrator brakes, the Air-Hydraulic brakes, and the Straight-Air brakes, are described with application information in Bulletin Form KU-50, published by Wagner Electric Corp., 6459 Plymouth Ave., St. Louis, Mo.

MISCELLANEOUS

Bakery Cleaning—The "Bakery Cleaning Handbook" describing methods and materials for use in cleaning bakery equipment, including such operations as washing bread pans, cake and pie pans, angel food pans, doughnut and deep fat fryers, stainless steel and nickel equipment, and so on, has been issued by Magnus Chemical Co., Garwood, N. J.

Cleaning and Sterilizing—A bulletin describing the use of Diversol in the cleaning and sterilizing of food plant equipment and utensils is being distributed by the Diversey Corp., 53 W. Jackson Blvd., Chicago.

Pectin—A "Confectioner's Handbook," for the use of citrus pectin, giving formulas, directions and useful information for candy makers has been issued as a 36-page illustrated bulletin published by Products Dept., California Fruit Growers Exchange, Ontario, Calif.

Protective Coatings—Various types of protective coatings, including rubber coatings for tanks, valves, fittings and equipment, coatings made of Volcazite, a mineral product, and various inhibitors for preventing rust are described in a comprehensive 45-page catalog issued by Protective Coatings, Inc., 10391 Northlawn, Detroit, Mich.

BOOKS

Dairy-plant Engineering

DAIRY ENGINEERING. By Arthur W. Farrall. Published by John Wiley & Sons., Inc., 440 Fourth Ave., New York, N. Y. 1942. 405 pages; 6¼x9¼ in.; cloth. Price $4.

More books of this type ought to be written for the food industries. This type of information is necessary to efficient application of the knowledge developed by food technologists.

This book presents the engineering phases of dairy-plant operation with sufficient fundamental information to be useful to the practical plant operator as well as to the trained engineer. It covers not only plant operation but the selection, installation and management of the equipment.

Here are the subjects covered in the 21 chapters: Physical and chemical properties of milk; simple mechanical principles; power transmission; electrical power and equipment; hydraulics and pumping; heat measurement, transfer and control; steam and its use in the dairy; principles of refrigeration; insulation and cold-storage rooms; heaters, coolers and heat-exchange equipment; ice cream freezing equipment; homogenizers; pasteurizing equipment; evaporating and drying equipment; can washing and sterilizing equipment; bottle washers and fillers; cream and butter handling equipment; cheese and casein plant equipment; equipment maintenance; pipe, pipe fittings, fitting and soldering; dairy-plant design, layout and utilization.

There are no less than 84 tables of practical data pertinent to dairy engineering, as well as many charts, drawings and photographs.

British Air Raid Book

AIR RAID PRECAUTIONS. Published by Chemical Publishing Co., 234 King St., Brooklyn, N. Y., 1941. 269 pages; 6x8¾ in.; cloth. Price $3.

Probably no one knows more about protecting property and people from air raids than the English. Which makes this book of particular value, since it was compiled by British experts and is based on actual experiences during air raids.

The book is divided into ten parts: Rescue Parties and Clearance of Debris; Organization of Decontamination Services; Organization of Air Raid Wardens' Service, Structural Defense, Local Communications and Reporting of Air Raid Damage, Notes on Training and Exercises, Gas Detection and Identification Service, Protection of Windows in Commercial and Industrial Buildings, Inspection and Repair of Respirators and Oilskin Clothing, and Care and Custody of Equipment.

Preventing Sabotage

SABOTAGE — HOW TO GUARD AGAINST IT. Published by National Foremen's Institute, Inc., Deep River, Conn. 1942. 57 pages; 5½x8¼ in.; cloth.

Two purposes are accomplished by this book. First, it cites several dramatic and disastrous sabotage cases to impress upon the reader the need for precautions. Second, it lists many things that management should do to forestall the would-be saboteur.

Vitamin Information

VITAMIN SUMMARY AND CEREAL FOOD FACTS. Published by Quaker Oats Co., Nutrition Department, 345 East 25th St., Chicago, Ill. 1941. 4 pages; 8½x11 in. folder.

Complete from photomicrographs of crystal structure to listing of their important food and specialty sources, the 1941–42 edition of this helpful summary covers vitamin A, thiamin, riboflavin, nicotinic acid, vitamins C, D, E, K and B_6 and pantothenic acid.

Other pertinent information concerning these vitamins is compiled under the appropriate headings of Probable Formulas, Chemical Names and Important Properties; Units and Weights; Methods of Laboratory Measurement; Best Known Functions; and Daily Allowances for Adequate Nutrition as recommended by National Research Council in 1941.

Facts About Spices

A SHORT STUDY OF SPICES. Published by Knickerbocker Mills Co., 601 West 26th St., New York, N. Y. 1942. 47 pages; 6½x10 in.; cloth. Price, $1; free to selected list.

Everyone using spices and others with a thirst for knowledge about them will find this little book worth reading and having around for reference. Starting with a world map showing sources of the principal commercial spices, seeds and herbs, the book gives the interesting history of spices, back to ancient China and India, and then presents specific information about the different spices. There is also a table listing the average weights of import packages.

PATENTS

Cream Having High Butterfat Content Cooled by Mechanical Means While Under Pressure—William T. Crighton, Springfield, Mo., to Producers Creamery Co. No. 2,267,081. Dec. 23, 1941.

Shortening Stabilized Against Rancidity Through Addition of Small Amount of Hydrogenated Crude Tocopherol—Alonzo E. Taylor and Jakob L. Jakobsen, Minneapolis, Minn., to General Mills, Inc. No. 2,267,224. Dec. 23, 1941.

Edible Nuts Cleaned and Polished by Mechanical Means—Albert W., Milton H., Edwin G. and Ernest Biddlecomb, Los Angeles, Calif. No. 2,267,321. Dec. 23, 1941.

Poultry Carcasses Deboned and Meat Reshaped in Roll Form With Skin Covering So That Meat May Be Cut Across Grain Into Slices for Frying—William Richard Clark, one-half to Thomas G. Clark, Columbia, Mo. No. 2,267,442. Dec. 23, 1941.

Elastic Artificial Sausage Skins Made From Plastic, Fibrous Mass of Animal Origin—Oskar Walter Becker, Heidelberg, Germany, to Naturin-Werk Becker & Co., Weinheim, Germany. No. 2,267,488. Dec. 23, 1941.

Confections Shaped in Mold Covered With Film of Cacao Butter Preparatory to Coating With Chocolate—Leonard Dotzer, Milton, Mass. No. 2,267,494. Dec. 23, 1941.

Baking Qualities Estimated by Determining Ratio Between Viscosity and Elastic Moduli of Dough—Philip Halton, St. Albans, England. No. 2,267,561. Dec. 23, 1941.

Chocolate-flavored Beverages Given Non-settling Properties With Addition of Mucilaginous Extract of Quince Seeds—Arthur Edward Siehrs, to Krim-Ko Co., Chicago, Ill. No. 2,267,624. Dec. 23, 1941.

Fruit Brushed to Increase External Appearance in Machine Fitted With Movable and Replaceable Brushing Rolls—John A. Chater, Medina, N. Y., to Niagara Sprayer and Chemical Co., Inc., Middleport, N. Y. No. 2,267,641. Dec. 23, 1941.

Puffed Soya Products Made from Dehulled, Disembittered and Cooked Beans—William J. Plews, Chicago, Ill., to Plews Processes, Inc. No. 2,267,747. Dec. 30, 1941.

Foods Converted Into Frozen State by Solidifying in Mold, and Then Deep Freezing After Releasing From Molds—Chester J. Conn, Smithtown Branch, N. Y. No. 2,267,789. Dec. 30, 1941.

Ice Cream Given Increased Overrun by Addition of About 0.18 Percent Sodium Hexametaphosphate and About 0.02 Percent Metaphosphoric Acid—Donald P. Grettie and Warren D. Roth, to Industrial Patents Corp., Chicago, Ill. No. 2,267,911. Dec. 30, 1941.

Glutamic Acid Made From Glutamic Acid Hydrochloride—Géza Braun, to Standard Brands, Inc., New York, N. Y. No. 2,267,971. Dec. 30, 1941.

Starch Given Thin-boiling and Thick-setting Properties by Treatment With Calcium Peroxide—Ralph Waldo Kerr, Riverside, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,268,215. Dec. 30, 1941.

Cereal-containing Receptacle Moved From Filling to Dumping Position by Motor-driven Tipple Mechanism—Donald E. Marshall, to Kellogg Co., Battle Creek, Mich. No. 2,268,220. Dec 30, 1941.

Fruit Juices Packaged in Sterilizing, Filling and Closing Chamber Containing Sterile Non-oxidizing Gas—Alfred L. Kronquest, Syracuse, N. Y., to Continental Can Co., Inc., New York, N. Y. No. 2,268,289. Dec. 30, 1941.

Animal and Vegetable Oils Refined by Being Pumped Into Vapor Separating Zone After Addition of Refining Reagent Preliminary to Centrifugal Separation of Foots From Oil—Benjamin Clayton, Houston, Tex., to Refining, Inc., Reno, Nev. Reissue No. 21,992. Jan. 6, 1942.

Foods Frozen During Passage Through Refrigerant Tank Equipped With Endless Conveyor and With Surge Tank to Permit Recirculation of Refrigerant—Raymond G. McMahon, to Fred Meyer, Inc., Portland, Ore. No. 2,268,551. Jan. 6, 1942.

Foods in Discrete Particle Form Held in Inverted Open-top Can in Closed Chamber Under High Temperature and Pressure to Permit Draining of Condensate During Sterilization With Live Steam Preliminary to Rerighting Can, Releasing of Clamp Over Open Top, and Hermetically Sealing Before Delivery From Sterilizing Chamber—Charles O. Ball, Oak Park, Ill., to American Can Co., New York, N. Y. No. 2,268,563. Jan. 6, 1942.

Animal, Vegetable and Fish Oils Treated to Saponify Free Fatty Acids While Being Forced Through Reaction Chamber Under High Velocity by Compressed Air With Subsequent Separation of Air and Reaction Products From Oil—Benjamin Clayton, Sugarland, Tex., Walter B. Kerrick, Los Angeles, and Henry M. Stadt, Glendale, Calif., to Refining, Inc., Reno, Nev. No. 2,268,567. Jan. 6, 1942.

Fruit and Vegetable Juices Forced Through Perforated Screen of Screw Housing by Back Pressure of Screw Whose Grooves Become Progressively Shallower Towards Discharge End and Whose Rims Are Steeply Sloped to Exert Endwise Force—Charles E. Kerr, Hoopeston, Ill., to Food Machinery Corp., San Jose, Calif. No. 2,268,753. Jan. 6, 1942.

Milk and Like Concentrated by Evaporation Preparatory to Spray Drying in Horizontal Chamber Equipped for Discharge of Dried Particles Under Controlled Humidity Conditions—Joseph M. Hall, Chicago, Ill. No. 2,268,871. Jan. 6, 1942.

Sucrose Extracted From Solutions Containing Both Sucrose and Glucose—John D. Ryan, Campbell, Calif. No. 2,268,902. Jan. 6, 1942.

Solids Formed During Chilling of Liquid Mechanically Kneaded and Rubbed Within Chilling Chamber Equipped With Scraper for Removal of Finished Product From Surface of Chamber—Gordon C. Schaub, Bayonne, and Jacob Schaub, Westfield, N. J., to Best Foods, Inc., New York, N. Y. No. 2,268,905. Jan. 6, 1942.

Liquid Sugar Protected Against Decomposition by Addition of Acetaldehyde Prior to Period of Storage—Lawrence T. Hopkinson, Washington, D. C. No. 2,269,203. Jan. 6, 1942.

Egg Meats Removed From Shell Through Hollow Needle by Vacuum—Harold Harcourt Cribb, Glenside, South Australia, to Vacuum Extractors, Ltd., Adelaide, South Australia. No. 2,269,254. Jan. 6, 1942.

Fruits and Vegetables Shredded by Motor-driven Cylindrical Rotor Fitted With Plurality of Cutter Blades—Hugh James Crawford, Oakland, Calif. Reissue No. 22,004. Jan. 13, 1942.

Puffed Cereal Products Made From Corn—John L. Kellogg, Jr., Battle Creek, Mich., to Helen L. Kellogg, Chicago, Ill. No. 2,269,536. Jan. 13, 1942.

Solvent-extracted Vegetable Oils Treated for Recovery of Phosphatide Content—Norman F. Kruse, Decatur, Ind., to Central Soya Co., Inc., Fort Wayne, Ind. No. 2,269,772. Jan. 13, 1942.

Fat-containing Material Treated in Continuous Manner in Chamber Held at Predetermined Temperature Above Boiling Point of Water and Equipped With Screw Conveyor Operating to Maintain Predetermined Pressure Upon Material Until Its Discharge at Delivery End of Chamber—Raymond T. Anderson, Berea, Ohio, to V. D. Anderson Co., Cleveland, Ohio. No. 2,269,898. Jan. 13, 1942.

Juices From Fruit and Vegetables Extracted in Chamber Filled With Inert Gas—Ronald B. McKinnis, Winter Haven, Fla., to Sunshine Foods, Inc. No. 2,270,007. Jan. 13, 1942.

Sirup and Like Dehydrated While Flowing Through Chamber Equipped With Tiers of Baffles Into Which Is Forced Stream of

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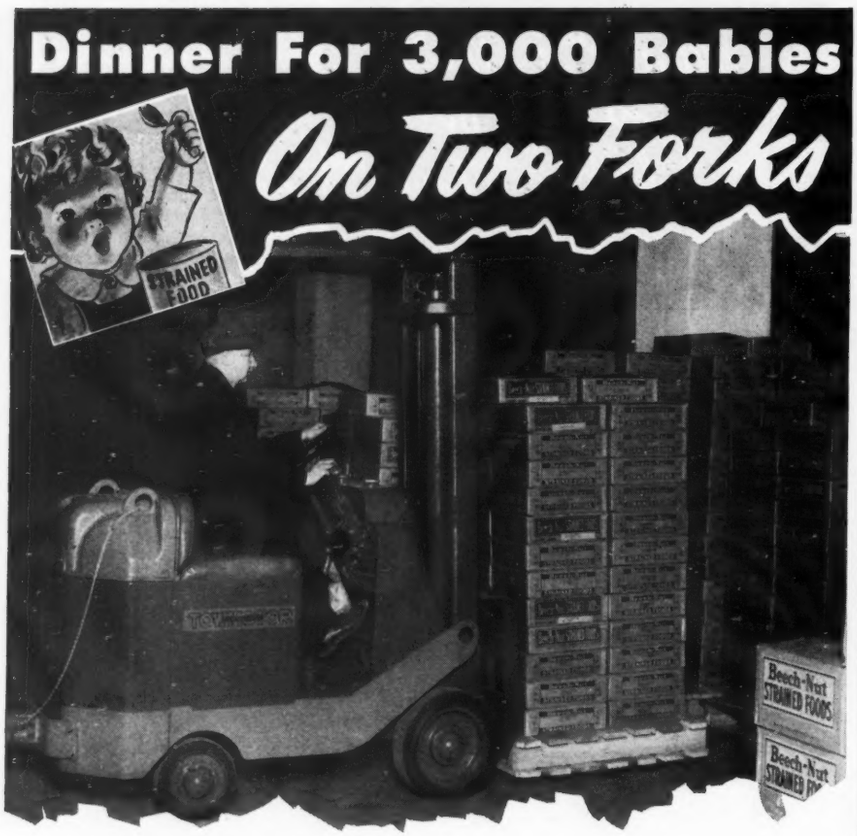

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Heated Air—Donald J. Pentzer, Herbert G. Miller, and Lee F. Moon, The Dalles, Ore. No. 2,270,138. Jan. 13, 1942.

Dextrose-producing Carbohydrate and Hydrochloric Acid Subjected to Heat and Pressure to Produce Levulinic Acid—Wendell W. Moyer, to A. E. Staley Manufacturing Co., Decatur, Ill. No. 2,270,328. Jan. 20, 1942.

Powdered Soup Mixture Made to Consist of Monosodium Glutamate, Thickening Agent and Flavoring Ingredient—Gustavus J. Esselen, Swampscott, Mass. No. 2,270,582. Jan. 20, 1942.

Fish Meat Ground to Form Homogeneous Paste, Shaped Into Units of Comparatively Small Dimensions and Dried for Future Consumption—Hjalmar Minde, Minde, Norway, one-half to Eirik Heen, Bergen, Norway. No. 2,271,272. Jan. 27, 1942.

Casein Treated With Not More Than 5 Percent Tributyl Citrate to Reduce Solution Foaming Tendency—John F. Corwin and Robert C. White, Bainbridge, N. Y., to Borden Co., New York, N. Y. No. 2,271,389. Jan. 27, 1942.

Freshly Killed Animal Carcasses Supported Along Back Edge in Open Flexible Molds and Subjected to Chilling to Set Structure—Andrew S. Hartanov and Frank B. Bratek, to Industrial Patents Corp., Chicago, Ill. No. 2,271,481. Jan. 27, 1942.

Fish Extract Solution Given Alum Content to Inhibit or Prevent Scale Formation During Concentration—Henry L. Pollard, Petaluma, Calif., to Western Condensing Co., San Francisco, Calif. No. 2,271,605. Feb. 3, 1942.

Canadian Patents

Sausage Casings Marked and Reinforced by Cementing Lengthwise Printed Vegetable Parchment Strips to Inside of Casing—Alpheus J. Freeman, to Name Corp., Chicago, Ill. No. 401,513. Dec. 16, 1941.

Milk Powder Containing Active Lactic Acid-producing Bacteria Prepared by Adding Bacterial Culture to Whole or Skimmed Milk or to Cream and Spray-drying—Ninnie M. Kronberg, Rydsgard, Sweden, to Svenska Mjolkprodukter Aktiebolag, Stockholm, Sweden. No. 401,542. Dec. 16, 1941.

"Blowing" Tendency of Cheese Reduced by Adding Soluble Bromate or Iodate During Curd Handling—Holger Jorgensen, to Aktieselskabet Dansk Gaerings-Industri, Copenhagen, Denmark. No. 401,567. Dec. 16, 1941.

Fatty Oils Stabilized Against Oxidative Spoilage by Adding Di-alkiamino-alkyl Ester Such as Di-ethylamino-ethyl Propionate—Theodor Sabalitschka, Berlin-Steglitz, and Erich Böhm, Berlin-Schöneberg, Germany. No. 401,716. Dec. 23, 1941.

Fish Heads Trimmed by Concave Blades Placed at Angle to Operate in Trough Through Which Fish Are Carried by Endless Belt—Ernest A. Jensen to British Columbia Packers, Ltd., Vancouver, B. C. No. 401,766. Dec. 30, 1941.

Milk and Other Fluids Sterilized in Containers Fitted With Check Valve and Placed in Retort—Franklin Orive and Julio R. Basualdo, Buenos Aires, Argentina. No. 402,129. Jan. 13, 1942.

Vegetables Washed in Machine Having Washing Zone Between Wide Lower Endless Belt and Narrower Upper Endless Belt; Both Perforated and Arranged for Effective Spray Washing of Bunched Root Vegetables Having Leafy Tops—Rudolph Berger and Harold N. Ricket, to American Specialty Co., Amherst, Ohio. No. 402,748. Feb. 10, 1942.

Sugar-containing Wort Fermented With Yeast Which Has Been Acid-treated at 10 to 100 Times pH Concentration Normal in Alcoholic Fermentation—Firmin Boinot, to Usines de Melle, Melle, Deux-Sevres, France. No. 402,847. Feb. 10, 1942.

Cans Vacuum Sealed by Generating Steam in Head Space, Covered Loosely by Closure Carrying Plastic Inlay to Make Contact With Flange of Can; Crimping Edge of Cover With Flange to Form Plastic Seal and Cooling Can to Create Partial Vacuum in Head Space—Lynn E. Davies to White Cap Co., Chicago, Ill. No. 402,974. Feb. 17, 1942.

Acid Detergent Makes Cans More Sanitary

(Continued from page 53)

acid treatment showed no change in the tin.

The acid treatment in the can washer is much less severe than in the laboratory test, because the quantity of active acid is really very small. For instance, samples of the acid solution from the solution tank taken at the beginning, middle- and end of the run were relatively weak although doing an excellent cleaning job. They averaged a pH of 6.32 and when 10 ml. was titrated with one hundredth normal (N/100) caustic soda only 0.25 ml. was required. Cresol red was used as the indicator because it has an endpoint at pH 7.2 which is thus near to true neutrality. The pH values show that the acidity of the cleaning solution by this gage is very close to that of milk, and the variation by titration from the neutral point is small.

After The War

At this time, when there are prophecies about the difference in world conditions which are going to prevail after the present war, it may not be out of place to mention one of the fields which the acid can washing procedure will open to give us greatly improved sanitation in the milk industry.

After the war it looks as if the unsanitary conditions which have existed with tinplated cans—such as open seams, rust spots and the more or less putrid odors arising from these, along with the expense of retinning the cans about once a year—may vanish. We will have no plated cans but a hard aluminum alloy of magnesium aluminum silicide from which a can will be made by spinning so that there will be no seams. It will be approximately one-third of the weight of the present one and in all will cost only about $1.50 more than the present can. This will make it a little cheaper than the tinned iron can after the first retinning, with the additional advantage that the aluminum will require no such treatment as long as it lasts. The surface will be hardened with the anodic finish. All this will be made possible in the future by the great surplus of aluminum that will be on the market after the war.

During this wartime period there may be a large scale adoption of lacquered cans. According to tests which the author ran in 1940, these will be satisfactory. Such cans should be made of black iron, welded instead of riveted, and sand blasted on the inside to give a dull grey finish. An appropriate clear lacquer should then be applied directly to this grey surface for baking, which is done at around 400 deg. F. This produces a hard, poreless, elastic coat. The outside of the can may be finished with some light-colored paint that will reflect the heat. With proper care, this coating may last as long as the tin and, if the process is sufficiently perfected, may continue after the war as a competitor of aluminum and tin.

The acid cleaner is the best product to use for both aluminum and lacquered cans. The corrosive action of alkali on aluminum is well known and it also breaks down the lacquers.

The acid detergent, when properly prepared for the intended use, like the one employed in this work, has a wide field of application. It may be used for dish washing and for cleaning plant equipment. And, just as the acid detergent is satisfactory and economical for washing cans, so it gives excellent results with economy in washing bottles. The same product may be used for sterilizing the bottles in place of chlorine.[3,4]

A summary of these results shows that the acid detergent in the can washer adjusted for the economical use of this agent will produce at the plant:

1. A cleaner and more nearly sterile can.
2. An odorless can which should aid in preserving the normal flavor of milk.
3. At most only one-tenth as much corrosion as the alkaline cleaner. No spangling of the tin surface.
4. The acid cleaner will keep the washer free of limestone deposits except possibly in a few spots where the plain hard water may dry on the hot machine.
5. A saving of 42 percent on the cost of detergent and approximately 20 percent on the cost of coal.

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Here is sifting efficiency at its height. The ROBINSON GYRO-SIFTER is driven by either a direct connected motor or from a counter shaft, with the gyratory motion of the sieve box produced through a fixed factory precision adjusted balance.

The material, entering through the feeder-distributor, is evenly spread over the full sieve surface and moves down the slightly inclined sieves toward the discharge end of the machine. In the travel the material is stratified, the fines passing through the cloth and the tailings returned for further milling.

Cloth openings are kept free by rubber balls which are constantly agitated by the machine motion and baffle rods which deflect the balls upward to strike the under surface of the cloth. The combination of rotary motion and impingent ball action creates a very high bolting efficiency and trouble free operating economy.

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What's Known About Dehydrating Vegetables

(*Continued from page 59*)

spinach on trays is exposed to this circulating moist air for about 10 minutes. This treatment is not permitted to increase moisture content to above 5 percent. The leaves are then flexible and may be packed readily.

Squash, Summer and Zucchini (Italian Squash)—These are the familiar, small, tender squash used as a fresh vegetable in summer. They are trimmed, washed, sliced about ¼ in. thick without peeling, trayed on screen trays at about 1½ lb. per square foot, steamed 6 to 8 minutes, and dehydrated at not above 150 deg. F., to less than 5 percent moisture. Both are quite satisfactory on refreshing and cooking.

Tomatoes—Tomatoes may be dried in slices and packed in that form for stewing; or they may be dried bone dry and then converted into a powder. The powder should be vacuum packed to prevent rancidification of the oil from the seeds.

For the former purpose tomatoes of deep red color and meaty flesh are washed, steamed or dipped in boiling water a short time to loosen the skins, chilled in cold water, peeled and cored by hand, sliced in slices about ¼ in. thick, spread one layer deep on trays, and dehydrated at not above 150 deg. F. to less than 5 percent moisture. By turning the trays of dried product upside down and tapping the bottom the dried slices may be dislodged. Monel metal screen or other screen not attacked by acid should be used. If the screen is oiled with white, neutral mineral oil (slab oil) previous to loading the trays, the dried tomatoes may be removed more easily.

Steaming the sliced tomatoes a short time, 2 to 3 minutes, gives a product of somewhat better keeping and cooking quality.

If to be powdered, the tomatoes are merely washed, cored, sliced without peeling and dehydrated bone dry. They are then ground in a hammer mill and the powder packed at once in friction-top cans to prevent caking. Or tomatoes may be made into puree and the puree dried to powder in a spray drier.

Turnips and Rutabagas—These are handled as previously described for carrots and parsnips. Shredding or slicing very thin before drying is preferable to ordinary slicing.

Soup Vegetables—The ingredients for a soup vegetable mix are dehydrated separately as previously described. The vegetables should be cut in small cubes or shredded into small pieces before drying. All should be well blanched until practically completely cooked before dehydrating. The dehydrated product may then be made into soup without preliminary soaking.

One satisfactory soup mixture is: Diced potatoes, 20 parts; turnips shredded, 10 parts; onions, thinly sliced, 6 parts; flaked, precooked dried white beans, 20 parts; peas, 20 parts; shredded carrots, 20 parts; and finely chopped celery, 4 parts. Whole, polished rice or pearl barley replace the flaked beans; they are used as "fillers" or "thickeners." If desired, small amounts of dried parsley, basil, pimiento or garlic may be added for flavor.

Yields

The yield of dried product of any given species varies considerably with the variety and its maturity. The yield of dried product per 100 lb. of fresh unprepared product is, of course, greater than per 100 lb. of fresh unprepared product, as there is considerable loss in sorting, trimming and peeling.

Nichols *et al*[22] give the following approximate yields in pounds of dried product per 100 lb. of the fresh prepared and ready for drying: Green pod beans, 10 to 13; cabbage, 8 to 12; carrots, 11 to 14; celery, 6 to 9; corn, 25 to 28; onions, 12 to 15; parsnips, 18 to 22; peas, 18 to 22; white potatoes, 22 to 25; pumpkin, 7 to 9; Boston Marrow squash, 11 to 14; spinach, 7 to 11; sweet potatoes, 32 to 33; tomatoes, 5 to 8; and turnips, 11 to 12.

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Data and Regulations on Use of Egg Yolk

(*Continued from page 65*)

of size to weight is helpful as a guide. (See Table I, taken from *Circular* No. 583 of the U. S. Department of Agriculture, entitled "Eggs and Egg Products.")

To satisfy the ruling that French ice cream must contain 3 lb. of frozen egg yolk for each 90 lb. of ice cream would require 94 of the size 11 eggs per pound; 91.4 of size 10; 87.2 of size 9; 81.9 of size 8; and 75.1 of size 7.

To satisfy the ruling that French ice cream must contain 1.5 lb. of dried egg yolk for each 90 lb. of ice cream would require 100 of the size 11 eggs per pound; 96.7 of size 10; 92.6 of size 9; 87.2 of size 8 and 79.8 of size 7.

The relationship between the size of eggs and the number required is shown in the accompanying chart. As seen from this chart, the number of eggs required to meet the definition of French ice cream will not be the same with frozen and dried yolks. In the case of frozen egg yolks, the number of eggs will be less than in the case of dried egg yolks, the difference being from 5 to 6 eggs more in the latter case. In all instances, however, the number of eggs required to furnish egg yolk solids for 90 lb. of ice cream mix to meet the rules and regulations relative to French ice cream is more than 5 doz. eggs. It will vary from 6 to 8 doz. eggs, depending upon the size of the egg.

The following information is taken from *Circular* No. 583 of the U. S. Department of Agriculture and should serve as a guide in figuring the amount of egg yolk:

"A case of 30 doz. eggs weighs about 42 to 43 lb. net and yields approximately 35 lb. of liquid whole egg. On an average, 100 lb. of shell eggs produces commercially about 84 lb. of liquid whole egg. Twenty whole eggs, 36 whites, or 48 yolks make 1 quart of product. The liquid egg from 9 to 11 shell eggs will weigh about 1 lb., and 17 to 20 whites or 19 to 22 yolks weigh 1 lb. One pound of dried eggs can be made from 39 liquid eggs; 1 lb. of dried yolk, from 48 yolks; and 1 lb. of dried albumen from 70 whites."

If the ruling of the Food and Drug Administration adheres to the use of egg yolk solids equivalent of 5 doz. egg yolks to each 90 lb. of French type ice cream, then, in case of dried egg yolks, it would be 1.36 lb., containing not less than 95 percent total egg yolk solids.

In case of frozen egg yolk, the required amount would be 3 lb., containing not less than 43 percent egg solids.

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

PACKAGING

Reducing Tin in Tin Cans

THIS project had as its objective a study of the practicability of reducing the amount of tin on tinplate used for food containers. Cans were manufactured from tinplate carrying two different weights of tin coating. Control cans carried the usual commercial tin coating then in use, while the experimental cans were prepared to effect a saving of 16.7 percent of tin. Both lots of cans were exactly alike in every respect except in the difference in the weight of the tin coating. Control and light-weight cans were packed with representative classes of food products producing varying degrees and types of corrosion and discoloration. The various packs have been held at a constant temperature of 85 deg. F. for periodic examination.

After the cans had been in storage for 12 months, the conclusion of the observers was that there was no difference in service value between the normal and light-weight tinplate. However, the loss in vacuum as measured by the "flip vacuum" test showed a somewhat greater loss in the case of dried sirup-packed prunes in cans with the lighter weight tin coating.

The results of these experiments using cans with a greater tin coating reduction and held under accelerated corrosion conditions warrant the conclusion that the light-weight tinplate now in commercial use is suitable as a container for those products having little or no corrosive action.

Digest from "Tin Conservation Project," by E. J. Cameron and J. R. Esty, Annual Report to the Research Committee, 1941, National Canners Association Research Laboratories, Washington, D. C., January, 1942, p. 16.

ENGINEERING

Driers for Foods

A DRIER which can be built, complete with all accessories, including refrigeration and control units, for about $400 is exceptionally useful for investigating optimum drying conditions and for compiling data on rate of drying.

It operates at dry-bulb temperatures between 0 and 100 deg. C. (water may be frozen or boiled in the apparatus), with temperature controls which are accurate within 0.1 deg. C. This experimental drier is adaptable to a wide variety of conditions and food products. It has an insulated sheet-metal duct system with circulating air which is cooled by a refrigerated coil, dehumidified and then heated electrically to the desired temperature. A large mixing chamber for the dehumidified air is placed before the drying chamber.

At relatively high temperatures and humidities the cooling and dehumidifying load is carried by admitting a small volume of room air without the aid of the cooling coil. Air velocity is adjustable over a wide range for study of its influence on drying rate. Humidity is controlled by direct admission of steam to the drier through a reducing valve which lowers the line pressure to about 5 lb. Separate controls for the dry-bulb temperature and the wet-bulb temperature are provided. Since air velocity must be at least 15 ft. per second for proper operation of a wet-bulb control, and since this is faster than the usual air flow in drier ducts, provision is made for a flow of 18 ft. per second on the wet-bulb control.

This drier is so adaptable that it can be used in experiments for preventing desiccation as well as in drying food products.

Digest from "Laboratory Apparatus for Controlled Experimental Drying of Foods," by E. C. Ritchell, E. L. Piret and C. A. Mann, *Proceedings of Institute of Food Technologists*, 1941, p. 23.

VITAMINS

Ascorbic Acid Content Of Onions

DETERMINATION of the ascorbic acid values for 16 varieties of onions, using the chemical titrimetric method demonstrates vital differences. The amounts observed varied from 0.17 mg. per gram for Crystal White Wax to 0.40 mg. per gram for Early Red Globe when completely fresh material was used for analysis.

Small onions were found to contain from 32 to 141 percent more ascorbic acid than large onions of the same variety. The central leaves of the onion bulb have a much higher concentration of ascorbic acid than the peripheral storage leaves.

If the onions are stored under home conditions they lose from 47 to 80 percent of their value as compared to the original fresh raw onions. Losses also occur during cooking that range from 10 to 65 percent, depending upon the time factor and whether or not the amount of cooking water remains constant.

Raw, freshly harvested onions contain relatively high concentrations of ascorbic acid. Their contribution to vitamin C needs would probably be important if an improvement in storage conditions could be effected in order to retain a large percentage of the original value.

Digest from "Ascorbic Acid Content of Onions and Observations of Its Distribution," by Elizabeth F. Murphy, *Food Research*, Vol. 6, 581-593, Nov.-Dec., 1941.

Thiamin in Wheat

THE major portion of thiamin in wheat occurs in those tissues of the wheat kernel just beneath the outer bran. These tissues are responsible for the high thiamin content of the feeds such as red dog and shorts. There is a high correlation between thiamin and the ash in the milling fractions having 2.5 percent or less of ash. Above this value the correlation is less significant because of the varying amounts of outer bran tissues, which tissues are low in thiamin content.

Digest from "Thiamin in the Products of Wheat Milling and in Bread," by R. C. Sherwood, Robert Nordgren and John F. Andrews, *Cereal Chemistry*, Vol. 18, 811–819, November, 1941.

GRAINS

Growth of Tribolium In Flour

ALTHOUGH previous studies had indicated that vitamin B_1, unlike riboflavin, is not an essential growth factor for the Tribolium flour beetle, it appears from feeding tests made by the Research Association of British Flour Millers that this beetle needs several members of the vitamin B complex for nutrition.

Patent flour (40 percent extraction) is low in vitamins, and the growth rate between hatching and pupation is notably accelerated by fortifying patent flour with vitamin B_1 in the beetle's diet.

Either riboflavin or nicotinic acid will also accelerate growth, shortening the larval period by as much as a third. These members of the B complex are necessary but not sufficient.

A fourth factor, without which the larvae will not pupate even when receiving all three of the other factors, has now been identified as adermin (vitamin B_6). Whole wheat is at least three times as rich in adermin as in riboflavin. The importance of synergism among vitamins in nutrition is illustrated by the fact that in this case both adermin and vitamin B_1 are essential, but neither is effective by itself.

Digest from "Flour and the Growth of Tribolium," By E. Barton-Wright, *Nature*, Vol. 148, 565, 1941 (Published in England).

Water Content of Wheat

THREE WHEATS (White English, Plate and No. 3 Pacific Manitoba) representing weak, medium and strong varieties were tested for moisture content as influenced by temperature and humidity. The differences were very small. At 10 deg. C. there was practically no difference in moisture content between whole and coarsely ground grains, once equilibrium was reached, but moisture absorption and drying are much slower in the whole grains than in coarsely ground wheat. As is usual with adsorption phenomena, moisture content is lower at 25 deg. C. than at 10 deg. C. for a given relative humidity. The rate of moisture absorption is rapid at first then approaches equilibrium slowly. Equilibrium is reached faster at high than at low temperatures. The table shows moisture absorption relations. A=g. H_2O per 100 g. wheat. B=g. H_2O per 100 g. dry matter.

Percent rel. hum.	Weak wheat		Medium wheat		Strong wheat	
	A	B	A	B	A	B
10	7.22	7.78	7.51	8.12	6.88	7.33
30	10.74	12.04	10.54	11.79	10.70	11.98
50	13.28	15.32	12.50	14.28	13.21	15.21
70	15.22	18.00	14.32	16.72	14.36	16.76
80	17.04	20.53	16.42	19.65	16.62	19.93
95	23.9	31.3	24.8	33.0	24.6	32.5

Digest from "Water Content of Wheats as a Function of Temperature and Humidity," by R. Gane, *Journal of the Society of Chemical Industry*, Vol. 60, 44T, 1941. (Published in England.)

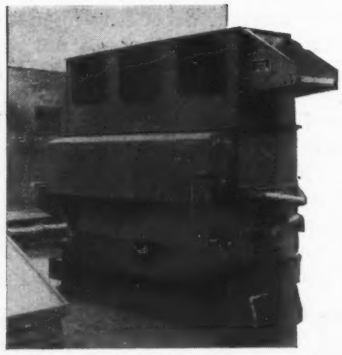
BEVERAGES

Carotenoid Pigments In Orange Juices

A PRELIMINARY ANALYSIS indicates that much of the yellow color in the orange flesh is due to either soluble or carotenoid pigments. Results obtained from experiments consist of the proper appraisal of quality and food value of Florida oranges with respect to carotenoid pigments in the juices.

During the period of these observations, the early and mid-season oranges showed a gradual increase in carotenoid pigments. Valencia oranges (late) showed an increase in pigments in the juice up to February or March and this was usually followed by a decline. Seasonal changes in the Mandarin type of oranges for the most part were similar to those in the sweet orange type, but the Mandarin varieties were much higher in carotenoid pigments than other varieties. Ripening in all varieties was characterized by an increase in soluble solids and in pH values and a corresponding decrease in total acids and in ascorbic acid. The amount of carotenoid pigments in the juice generally varied with the locality in which the fruit was grown, there being a suggestion that low pigment content was associated with soil of low fertility.

The degree of pigmentation in the



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juice was not an index of stage of maturity nor always of quality. The early and mid-season fruits were marketable before attaining maximum percentages of pigments, and Valencias were frequently marketed after decline had set in.

Digest from "A Physiological Study of Carotenoid Pigments and Other Constituents in the Juice of Florida Oranges," by Erston V. Miller, J. R. Winston and D. F. Fisher, *Technical Bulletin 780*, U. S. Department of Agriculture, Washington, D. C., April 941.

MEATS

Flavor of Canadian Bacon

COMPARISON of Canadian Wiltshire bacon with Danish bacon showed that, in general, the Canadian product contained more curing salts and was drier and tougher. The proportion of fat was about equal, but the fat was slightly softer in Canadian than in Danish bacon. Among the factors influencing flavor, excessive retention of curing salts was a particularly potent cause of impaired flavor in Wiltshire bacon. High moisture content, tenderness and deficiency in quality or quantity of fat are secondary contributing causes. For better flavor in Canadian Wiltshire bacon milder cures are advisable, and improvements in handling and curing practices are needed. For instance, general adoption of uniform practice in selecting and grading sides would lead to better quality and flavor.

Digest from "Canadian Wiltshire Bacon. XX. Comparison of Certain Chemical and Physical Properties of Canadian and Danish Bacons and Their Relation to Flavor Quality," by W. H. White, C. A. Winkler and W. H. Cook, *Canadian Journal of Research* 19D, 213, 1941; also issued as Paper No. 65, Canadian Committee on Storage and Transport of Food, and as NRC No. 998, National Research Council, Ottawa.

DAIRY PRODUCTS

Stilton, Cheshire, And Cheddar Cheeses

STILTON cheese may be regarded as a luxury cheese, not favored in wartime. It is poor in calcium and phosphorus because the curd is bathed a long time in its own whey while considerable acidity is allowed to develop. Drainage of the whey, without pressure on the curd, is carried on for about seven days. Calcium is largely bleached out, and what remains tends to migrate toward the surface, where much of it is finally contained in the cheese coat, discarded by most consumers. In nutritive value,

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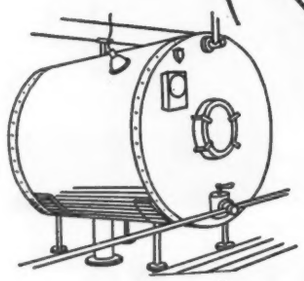

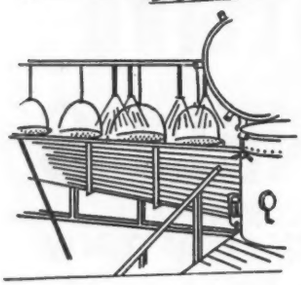

■ Food and beverage plants alike often find that bacterial contamination causes real dollars and cents losses both in spoilage and in hard-won customer acceptance. Food plant operators need not risk such losses, however, when effective bacteria control is so simple and inexpensive.

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Cheddar cheese is slightly superior to Cheshire and Leicester cheese. A vitamin study of these cheeses showed nearly complete retention of the vitamin A and carotene from the original milk. The vitamin contents of 1 gram of cheese, as found in a winter and summer test are shown in the following table:

	Vitamin A		Carotene	
	Winter	Summer	Winter	Summer
Sample	(I.U.)		(microns)	
Milk	0.8	1.6	0.06	0.33
Cheshire	6.8	12.9	0.53	2.5
Cheddar	7.0	15.2	0.61	3.1
Stilton	8.0	18.4	0.64	3.6

	Vitamin B_1		Lactoflavin	
	Winter	Summer	Winter	Summer
Sample	(microns)		(microns)	
Milk	0.33	0.44	0.78	1.3
Cheshire	0.45	0.49	2.8	3.5
Cheddar	0.53	0.55	3.1	2.8
Stilton	0.79	0.68	2.3	3.5

Digest from "Cheese: Some Recent Chemical and Physicochemical Findings," by H. D. Kay, *Chemistry and Industry*, Vol. 60, 411, 1941 (Published in England).

MISCELLANEOUS

Tomato-seed Oil

TOMATO seeds, as a byproduct accumulating in the manufacture of tomato products, can be utilized as a source of edible oil. A sample of dried seed (with the down left on) yielded 17 percent oil by cold pressing. Extraction with ether on a laboratory scale (in a Soxhlet extractor) gave a yield of 33.1 percent. Without any refining except a single filtration the oil was perfectly clear, with an agreeable odor and a bland flavor. Its color components in the Lovibond tintometer were: yellow 35, red 7.2. Analysis showed the following constants:

Specific gravity at 15 deg. C.....	0.9206
Viscosity at 50 deg. C. (Engler degrees)	3.48
Acid number	3.2
Saponification number.....	192.09
Iodine number (Hanus method)..	112.6
Acetyl number.....	28.34
Hehner index.....	94.76
Unsaponifiable	1.45
Melting point of fatty acids.....	30 deg. C.

Tomato-seed oil is in the semidrying class and can be converted to a useful paint vehicle. It can also be used in soap making and as an illuminating oil. But its greatest value as an aid in lowering the production cost of tomato products is in its edible qualities. It is a readily acceptable salad oil and can also be used to good advantage in making margarine. Its physical and chemical properties are favorable to its utilization as a cooking fat. Its use is recommended as an added resource among the edible oils.

Digest from "Tomato Seed Oil," by Maria Paes Barreto Cavalcanti, *Revista de quimica industrial*, Vol. 10, No. 114, 21, 1941 (Published in Brazil).

FORMULAS FOR FOODS

FORMULA NO. 293

Prepared Orange Beverage

Sugar	64 lb.
Salt	2 oz.
Powdered orange juice	2 lb. 8 oz.
Citric acid	1 lb. 8 oz.
California orange oil	2 oz.
Orange shade	3 oz.

Mixing Directions

Place 48 lb. of sugar, salt, powdered orange juice and citric acid in machine bowl and blend thoroughly. Blend 16 lb. of sugar, orange oil and shade carefully and add to first mixture. Use additional sugar as required.

Mix well and sift through fine sieve. One pound produces one gallon or more of beverage.

Formula from Parker-Broeg.

FORMULA NO. 294

Butterscotch Kisses

Corn sirup	50 lb.
Granulated sugar (fine)	40 lb.
Dairy butter (salted)	15 lb.
Standardized invert sugar	10 lb.

Mixing Directions

Melt the butter, add the sugar and mix well, then add the balance of the ingredients together with 9 lb. of fresh cream containing from 18 to 20 percent of butter fat. Cook the batch to a firm ball, and when it has stopped boiling add 5 lb. of kiss frappé (Formula No. 234) and 6 oz. of salt. If desired, a little vanilla, lemon, orange or a combination of flavors can be used in these kisses. Cool and handle as usual, but do not pull. When firm enough to handle, spin, cut and wrap.

Formula from Nulomoline Co.

FORMULA NO. 295

Dried-fruit Cereal

Ground dried fruit	100 lb.
Corn sugar	100 lb.
Wheat bran	50 lb.
Whole-wheat flour	100 lb.
Salt	3 lb.
Baking powder	3 lb.

Mixing Directions

Mix all ingredients except baking powder with water to give the desired consistency. Then mix the baking powder in quickly and make the dough into loaves. Dust with whole-wheat flour and place in pans greased with nonrancidifying fat and bake to about 410 deg. F. The loaves are then sliced and the slices are dried bone dry on trays in a dehydrator. These are then coarsely crushed, screened to uniform size, toasted a short time at 300 deg. F. and packed in attachment line, paraffine wrapped cartons.

Formula from "Utilization of California Fruits," by W. V. Cruess and G. L. Marsh, University of California, College of Agriculture, Circular 349, October, 1941, page 36.

FORMULA NO. 296

Caledonian Short Bread

Cake flour	6 lb.
Soda	⅛ oz.
Salt	½ oz.
Sugar (6X)	2 lb.
All-purpose vegetable shortening	2 lb.
Butter	2 lb.
Whole eggs	1 lb.

Mixing Directions

Sift the flour, salt, soda and sugar. Rub together thoroughly with the shortening and butter until a fine crumb is obtained, as for a pie crust. Add the eggs and mix thoroughly. The eggs should have a temperature of 60 to 70 deg. F. Refrigerate dough for 2 hours before making up into desired units. Bake at 365 to 370 deg. F. Remove from pan when cool.

Formula from Lever Bros. Co.

FORMULA NO. 297

Banana Rye Bread

Ripe bananas	27 lb.
Sugar	15 oz.
Vegetable shortening	2 lb. 4. oz.
Salt	12 oz.
Rye flour	24 lb. 12 oz.
Yeast	1 lb. 8 oz.
Water (variable)	1 lb. 8 oz.

Mixing Directions

Place the ripe bananas in mixer and beat to break up thoroughly. Add sugar, vegetable shortening and salt, and mix until smooth. Then add 12 lb. 12 oz. of rye flour and mix only enough to incorporate. Dissolve the yeast in water and add slowly. Add remaining 12 lb. of rye flour and mix only enough to incorporate.

The dough temperature should be between 78 and 80 deg. F.; first rise from 1½ to 2 hours; second rise 45 minutes to 1 hour. Weigh, round, let relax and mold. Brush tops with melted shortening; then proof double size. Use 1 lb. 10 oz. dough for 8 x 4½ x 2¾-in. loaf pan. Bake at 425 deg. F. for 5 minutes or until crust begins to turn brown. Reduce temperature to 350 deg. F. for 35 to 40 minutes, or until bread is done.

Be sure to use only vegetable shortening in this bread since it must contain no milk products. It is frequently called an "allergy bread" because it is made without egg, milk and wheat.

Formula from Fruit Dispatch Co.

FORMULA NO. 298

Billowy Marshmallow

Gelatine	1 lb.
Water (cold)	8 lb.
Eggs (white)	15 lb.
Sugar (icing)	65 lb.
Standardized invert sugar	10 lb.
Flavor and color	(as desired)

Mixing Directions

Soak the gelatine in the cold water. Heat the soaked gelatine carefully until fluid (about 140 deg. F.). Add the fluid gelatine to the egg whites, 35 lb. of sugar and the standardized invert sugar. Whip this mixture until it is fairly stiff. Just before finishing the whipping, add the remaining 30 lb. of sugar along with the flavor and color. Beat until of the consistency of marshmallow.

For banana flavor, use for each 10-lb. batch about 4 oz. of ripe banana powder containing dry milk solids. Incorporate it in any way convenient, preferably first blended with about an equal weight of sugar.

Formula from Nulomoline Co.

FORMULA NO. 299

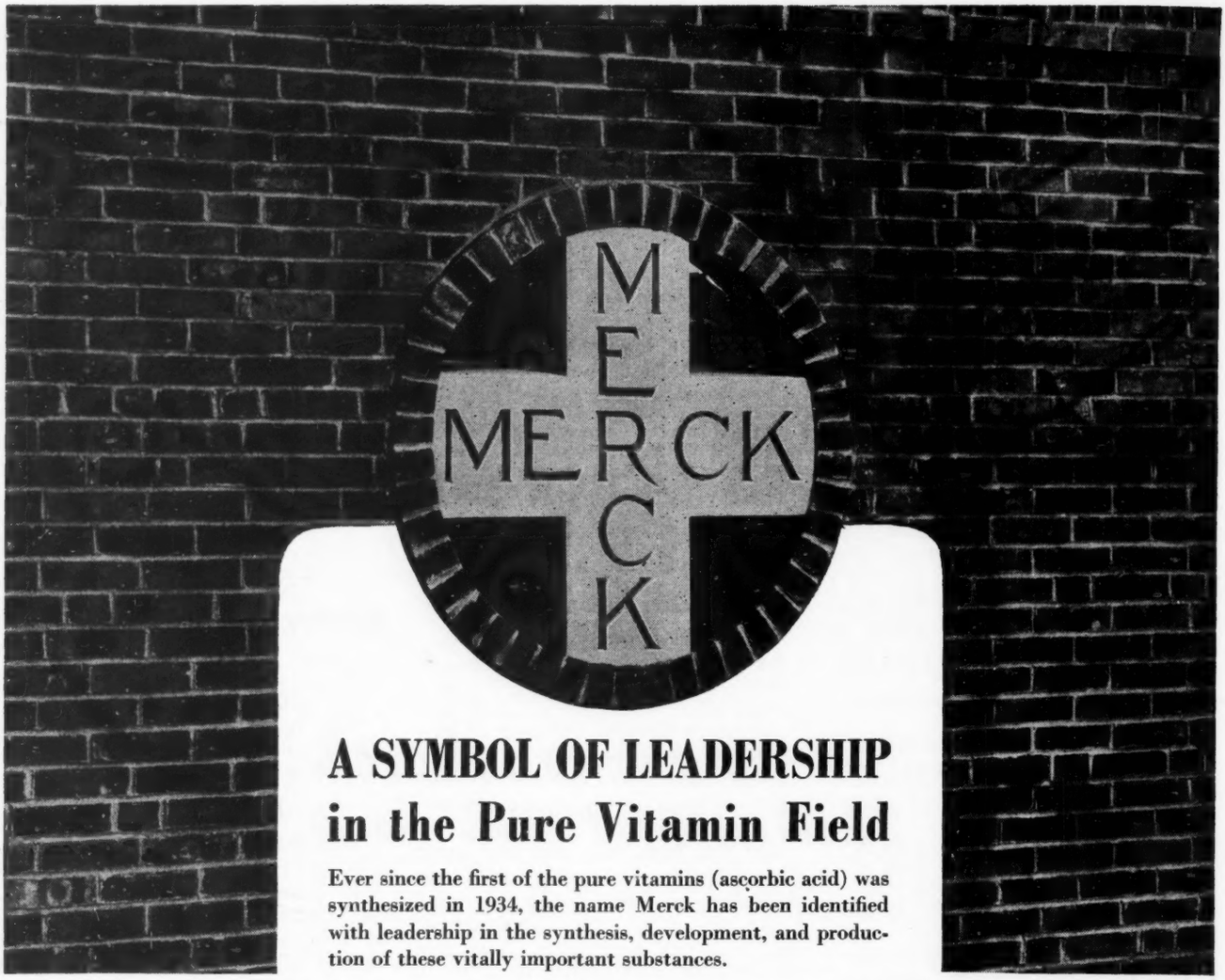
Cinnamon Torte

(Butter base cake)

Sugar	1 lb. 5 oz.
Butter	1 lb. 5 oz.
Egg yolks	1 lb. 2 oz.
Milk (liquid skim)	1 lb.
Baking power	1 oz.
Flour	1 lb. 8 oz.
Vanilla extract	⅛ oz.

Mixing Directions

Cream sugar and butter until light. Add egg yolks gradually. Continue creaming until very fluffy. Add milk and baking powder, flour and vanilla mixture in alternate portions. Mix only enough



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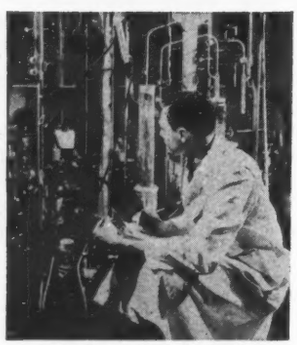
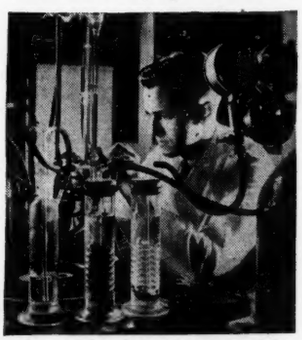


Catalytic Synthesis in Vapor Phase

Chemical Assay of Vitamin B_1

Isolation of a Vitamin



Analytical Test in Vitamin Procedure

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VITAMIN B_1
(Thiamine Hydrochloride)

RIBOFLAVIN
(Vitamin B_2)

NIACIN
(Nicotinic Acid)

NIACIN AMIDE
(Nicotinic Acid Amide)

VITAMIN B_6 HYDROCHLORIDE
(Pyridoxine Hydrochloride)

CALCIUM PANTOTHENATE DEXTROROTATORY

ASCORBIC ACID
(Vitamin C)

VITAMIN K_1
(2-Methyl-3-Phytyl-1, 4-Naphthoquinone)

2-METHYL-NAPHTHOQUINONE
(Menadione)
(Vitamin K Active)

ALPHA-TOCOPHEROL
(Vitamin E)

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to incorporate dry ingredients smoothly. Suggested scaling weight: 9 oz. in a 9-in. tin; 4½ lb. in an 18x26-in. sheet. Bake at 360 to 370 deg. F. for approximately 18 to 20 minutes.

Formula from Institute of American Poultry Industry.

FORMULA NO. 300

Caramel Chews

Corn sirup	30 lb.
Granulated sugar	20 lb.
Light brown sugar	10 lb.
Standardized invert sugar	5 lb.
Coconut butter	3 lb.
Unsweetened evaporated milk	16 lb.
Fresh cream (20 percent butter fat)	12 lb.

Mixing Directions

Use the cream and milk to dissolve the sugar and cook all of the ingredients until they form a fairly firm ball. Handle the batch carefully at the start of the cooking as there is danger of curdling if the milk and cream are added too quickly or left unstirred. Flavor with 4 oz. of salt and vanilla as desired. Pull, cut and wrap.

Formula from Nulomoline Co.

FORMULA NO. 301

Banana Butterscotch Pie

Butter	4 lb.
Brown sugar	6 lb.
Granulated sugar	6 lb.
Salt	4 oz.
Fresh liquid milk	46 lb.
Corn sirup	4 lb.
Cornstarch	6 lb.
Egg whites	4 lb.
Sugar	4 lb.

Mixing Directions

Place butter, brown sugar, granulated sugar, salt and 4 lb. of fresh milk in a steam-jacketed kettle. Bring to a boil, and boil to 240 deg. F. Turn steam off and add the corn sirup and 32 lb. of milk slowly while mixing thoroughly. Bring the mix back to boil and thicken with cornstarch and milk. The cornstarch should be dissolved in 8 lb. of milk. Cook thick and clear. Remove from kettle and place in a container. Cover at once with waxed paper. Press paper down on top of mix to prevent skinning. Place in a refrigerator and allow to cool. When cold, place mix in cake machine with paddle beater and beat smooth at high speed for two minutes. Then add remaining 2 lb. of milk and mix well. Beat the egg whites and sugar at high speed and fold into the above cream.

Fill prebaked pie shells one-third full of the cream. Allow three to four ripe bananas per 9-in. shell. Peel bananas

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and cut into ½ in. slices. Place slices close together on top of cooled filling so it is completely covered with bananas. Cover bananas immediately with enough additional filling to fill the shells. Run a border of whipped cream around the edge of the shells and two strips each way across the pies.

Formula from Fruit Dispatch Co.

FORMULA NO. 302

Basic Cake Mixture

Sugar	27 lb.
Salt	6 oz.
16 concentrate vanilla	0.5 oz.
Concentrated butter flavor	0.3 oz.
Glycerine	0.5 oz.
Emulsifying type shortening	10 lb. 8 oz.
Butter	1 lb. 8 oz.
Milk powder	3 lb.
Soda	3 oz.
Baking cream (cream of tartar substitute)	13 oz.
Very best grade cake flour	27 lb.

Mixing Directions

Add sugar, salt and butter to the mixture of vanilla, butter flavor and glycerine and mix together. Then add the remaining ingredients and finish mixing.

Formula from Parker-Broeg.

FORMULA NO. 303

Fudge-cake Mixture

Standardized invert sugar	3 lb. 12 oz.
Partially dutched cocoa	7 lb. 8 oz.
Soda	7.5 oz.
Sugar	6 lb. 4 oz.
Basic cake mixture (see Formula 302)	90 lb.

Mix the ingredients together and put aside to use.

Formula from Parker-Broeg.

FORMULA NO. 304

Fudge Cake

Whole eggs (or whites)	12 oz.
Fudge-cake mixture (see Formula 303)	5 lb.
Milk or water	2 pt.

Mixing Directions

Place eggs in the machine bowl and add the fudge-cake mixture. Slowly add one pint of milk or water and beat one minute on high speed. Add the remaining water or milk slowly.

Deposit into well-buttered, cup-cake tins, or into layer or sheet pans, buttered and paper-bottomed. Bake at 375 to 385 deg. F. Bake just barely done and cool in the pans.

Formula from Parker-Broeg.

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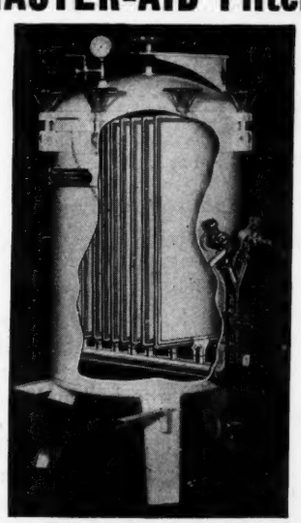

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